PAWTUCKET/CENTRAL FALLS *Commuter Rail Facility*

Feasibility Study & Site Analysis

Submitted to

City of Pawtucket

Department of Planning and Redevelopment

Submitted by

Vanasse Hangen Brustlin, Inc.

June 2007

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Vanasse Hangen Brustlin, Inc.

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June 2007

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Preface

The Pawtucket/Central Falls Commuter Rail Facility Feasibility Study and Site Analysis project was initiated by the Cities of Pawtucket and Central Falls to determine the viability of reestablishing a stop on the Massachusetts Bay Transportation Authority's (MBTA) Boston to Providence commuter rail line. The cities anticipate that a commuter rail stop in either Pawtucket or Central Falls would increase mobility for travelers, address travel demand, provide access to economic opportunity, improve the environment and quality of life, and enhance economic growth.

The project was organized into three phases, each designed to address a critical question:

- Phase I: Is it operationally feasible to restore commuter rail service to Pawtucket/Central Falls?
- Phase II: Of the two alternative sites for a commuter rail stop – the Former Station Site and the Rail Yard Site[1], which provides the best opportunities for rail service and community development?
- Phase III: What would the design of a commuter rail facility at the preferred site look like, and how would it impact the community?

As part of the study process, the City of Pawtucket secured an additional grant from the Rhode Island Statewide Planning Program's (RISPP) Planning Challenge Grant Initiative to further review the potential impact of transit-oriented development (TOD) around the preferred commuter rail stop location. This report documents the results of the expanded TOD analysis, which was conducted as part of the Phase III efforts. The Former Station Site was selected as the preferred site for a commuter rail stop[2].

[1] The location of these sites is described in detail in the Pawtucket/Central Falls Commuter Rail Facility Feasibility Study and Site Analysis Final Report.

[2] See Pawtucket/Central Falls Commuter Rail Facility Feasibility Study and Site Analysis Final Report Chapter 9 for selection of preferred site and Chapter 10 for detailed description of the proposed facility.

This document is organized into seven chapters:

- Chapter 1 provides an overview of transit-oriented development.
- Chapter 2 describes the public participation program implemented to educate residents in the area and provide an opportunity to provide input on neighborhood needs and concerns.
- Chapter 3 presents the results of an analysis of parking and traffic around the Former Station Site.
- Chapter 4 describes existing pedestrian, bicycle, and transit accommodations in Pawtucket and Central Falls, and explains how communities can design streets to encourage multimodal use.
- Chapter 5 introduces recommendations for improvements to the multimodal network in Pawtucket and Central Falls.
- Chapter 6 describes the current land use, housing, and employment characteristics in Pawtucket and Central Falls, and offers recommendations for policies to encourage transit-oriented development consistent with the surrounding neighborhoods.
- Chapter 7 summarizes the findings of the study and outlines implementation steps.

1

Overview of Transit-Oriented Development

Transit-oriented development (TOD) is a broad concept, but can be generally defined as mixed-use residential and commercial development centered on a public transit stop. It is frequently higher density than typical suburban development, and includes features designed to encourage transit ridership, such as narrow streets, restricted and/or reduced parking, bicycle facilities, and good pedestrian access. The highest-density use generally abuts the transit stop, with progressively decreasing density further from the center.

A high-quality and lasting TOD should blend into the surrounding neighborhood, knitting the community together. All residents should benefit from TOD, so careful consideration must be given to what type of TOD should be encouraged and how TOD can be designed to feel like a part of the existing community.

TOD can be developed in a variety of ways. If a government agency owns the land around the transit stop, the agency may enter into a public-private partnership with a developer to create a TOD. In other cases, a community may foster the growth of a TOD district by many private developers, through zoning and development regulations designed for that purpose.

For Pawtucket and Central Falls, the project team analyzed local traffic and parking conditions, multimodal access corridors, RIPTA transit connections, socioeconomic characteristics, and existing land uses to assess how housing and employment could be encouraged by development of a transit center at the former train station site on the Pawtucket/Central Falls city line. The team approached these subjects with the understanding that the areas around the former train station already contain established neighborhoods, unlike some TODs, where transit is introduced to undeveloped areas in the hope of incurring growth. Compatibility with the adjacent neighborhoods is therefore a very important aspect of potential TOD in Pawtucket and Central Falls.

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2

Education and Public Participation

The first step in this process was to explain what "TOD" means, and what it could mean for this community. Many communities are unaware of the policies that the local government could adopt to encourage the type of development the community would like. The term "TOD" can also draw concerns about parking, traffic, and other problems that new development could bring. Through extensive public outreach and education, residents become more informed and have the chance to provide input; after all, residents know their community best. One of the goals of this TOD study was to educate neighborhood residents and businesses about this project and to understand their concerns about future development.

In addition, Pawtucket and Central Falls residents had the perception that the introduction of new commuter rail service, the rehabilitation of the former train depot, and future development on and around the site are all tied together. A major focus of education process was to clarify the differences between these three components.

The public outreach program consisted of stakeholder interviews and two public workshops. This program was completed as a separate initiative beyond the general public involvement process for the overall commuter rail feasibility study[1].

Stakeholder Interviews

Phone interviews were conducted with local stakeholders to identify critical issues in the neighborhood. Suggestions for infrastructure and policy changes were received, and these have been reflected to large extent in the TOD recommendations for Pawtucket and Central Falls.

[1] See Pawtucket/Central Falls Commuter Rail Facility Feasibility Study and Site Analysis Chapter 2 for description of the public involvement activities carried out as part of the overall study.

Table 2-1: TOD Interviews

Name	Organization
Paul Redkovich	Blackstone Valley Community Action Program
Joseph G. Nield, Director	City of Central Falls Department of Public Works
John J. Garrahy	Moses Afonso Jackvony
Paul L. Ouellette	Northern Rhode Island Chamber of Commerce
Donald Grebien, President	Pawtucket City Council
Nancy Whit, Executive Director	Pawtucket Citizens Development Corporation

Public Workshop #1, May 10, 2007

The first community workshop was a 2-hour session consisting of presentations and breakout discussion groups. The workshop began with a project update, followed by an overview of the proposed commuter rail platforms and access, and an overview of TOD principles and best practices.

The second part of the workshop gave all participants an opportunity to speak with each other and with the facilitators about their concerns and visions for the future of the former train station site. For both break-out sessions, small groups gathered around a large aerial photo of the study area and wrote their ideas on the map. Break-Out Session 1 was intended to elicit responses to the question: What do you like and dislike about the area around the station? After 20 minutes, the large group reconvened and a representative from each small group reported on what had been discussed. Break-Out Session 2 gave participants 20 minutes to talk about their vision for the area, after which the large group heard what all the small groups envisioned.

Approximately 20 people attended the meeting, including representatives of local businesses, neighborhood development corporations, a local historic society, and other neighborhood groups. City councilors and other members of local government were in attendance as well. The flyers, agenda, presentation materials, and handouts from the meeting are included in Appendix A.

The community listed the following concerns during Break-Out Session 1:

Likes

Transportation & Access

- Feel safe walking
- Central location
- On bus line

Neighborhood Resources

- Drugstore on corner/local services
- Mom and pop stores
- Barton Street improved with new housing
- Neighborhood crime watch
- Cleanups/block parties
- Rents are affordable?
- PCDC--$14 million into the community (earth day, block party, got rid of prostitutes)
- Homey environment

Dislikes

Transportation

- Traffic after work
- On-street parking for tenants
- High-speed traffic is dangerous
- Snow??
- Too much traffic between 2 and 6 p.m. on Broad and Dexter, also at Barton
- Unsafe streets for kids to walk unsupervised and elderly to walk too
- Congestion—station is in the heart of the neighborhood
- Traffic congestion will increase
- Pedestrian safety from cars

Safety

- Montgomery Street feels unsafe
- Dark empty around depot
- People who hang around Walgreens
- Getting honked at
- Prostitutes/johns
- Violence
- 204 Broad Street—fence it in?
- Prostitutes want train riders for higher clientele
- Poor lighting everywhere—on Broad St. & around the station

Economic Development

- Not enough jobs today or from station
- Station isn't economically feasible
- Fear of landlords buying up properties and gentrifying the area
- Fear of taxes going up
- PCDC efforts will be for nothing if train ruins all their progress
- Gentrification will push low-income and elderly residents out of their homes

Environment

- Noise from traffic and train
- Fear of losing neighborhood feel
- Fear of losing the unity of community to outsiders

Public Process

- So much $$ already gone into station, why not put it into community improvements that you are saying will happen as result of station?
- Want to see a medical facility—where are city priorities?
- Don't want outsiders, who don't live there but scream "Save the building!" Why should they have a say in what happens in our neighborhood?
- Process hasn't had residents' interest at heart, they are an afterthought
- Schools need $$, why not invest in them?
- Priority for Boston commuters, not us

The community listed the following visions during Break-Out Session 2:

Housing Affordability

- Affordable housing
- A rent control-type program
- Different tax rates for multiple-property owners vs. single-property owners
- Tax stabilization
- Homestead protection
- Concern about gentrification

Economic Development

- More retail (small businesses)
- New jobs
- Protect existing small businesses
- No empty storefronts – retail mall
- Use the revenue from the TOD to fund community improvements

Driving Environment

- Potholes fixed
- Better design of traffic patterns
- No parking at train station (so it won't create new traffic)
- Prevent overflow commuters from South Attleboro park-and-ride

Pedestrian Environment

- Lighting
- Clear signage
- Regular street cleaning
- Better sidewalks to avoid tripping

Community Amenities

- Parks and other types of green space
- Public pool, playground
- Benches
- Place for teens to hang out, such a recreation center
- Make the area livelier, with tourist attractions about the history of Pawtucket (jewelry, etc.)
- Community programs for kids

Proposed Train Station Site

- Tear down the train station
- Preserve the train station building
- Use the proposed site as a train station
- Use Cumberland/Smithfield Ave. locations
- University Campus
- Education programs
- Arts programs
- Johnson and Wales program
- Medical facility
- Community center
- Do something with the vacant building at the proposed site
- Find creative solutions to fix it

Other

- Scholarship money for kids who take the train to URI
- Fast development schedule
- Don't attract outsiders
- No more crime
- More undercover cops
- Want private security
- Create a feeling of safety
- Get rid of prostitution in the area
- Keep the character of the neighborhood the same
- Preserve the residents' existing way of life
- Concern for fellow neighbors
- People come first
- Recognize that there are two issues: the fomer train station building and the platform below
- Use City money to benefit residents, not commuters

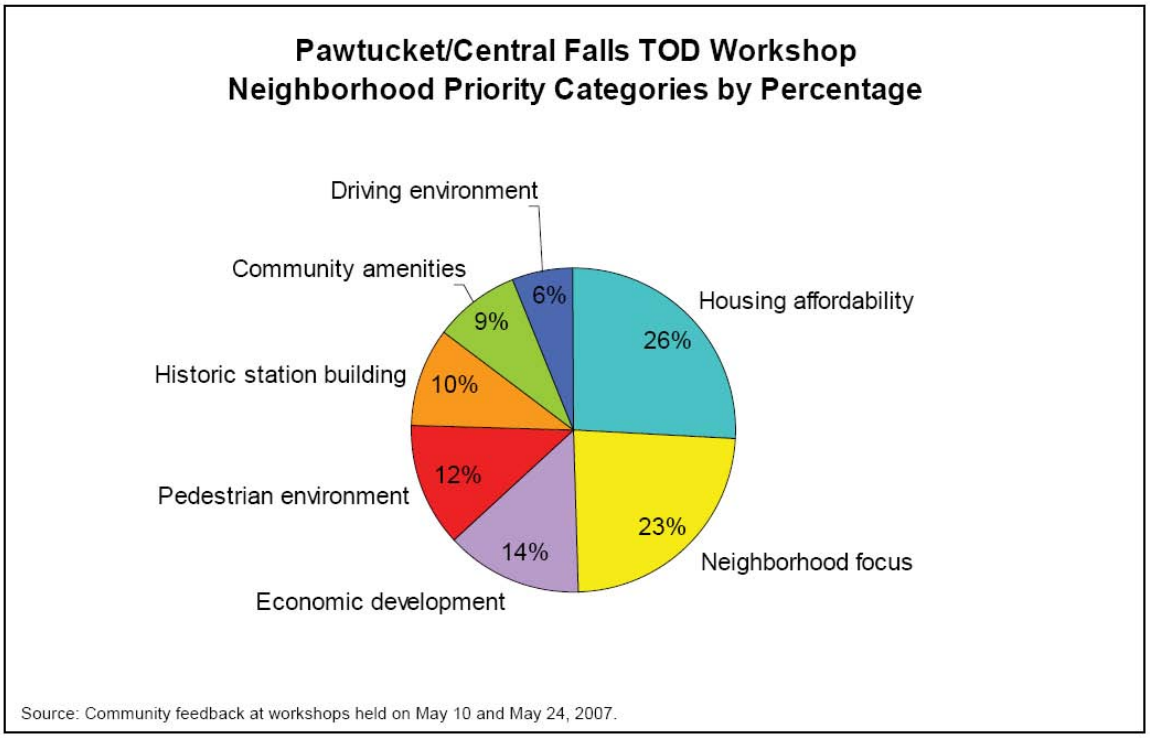
Public Workshop #2, May 24, 2007

At the second community workshop, the public had an opportunity to expand on its concerns and hear answers to its questions about five topic areas related to the Pawtucket/Central Falls Commuter Rail Facility: traffic and parking, jobs and housing, neighborhood safety, details of the proposed commuter rail stop, and options for reuse of the former train station site.

The format of this workshop was an informal 2-hour open house during which members of the public could drop by at any time. Upon entering the room, people were given dots to place on a list of concerns identified in Workshop #1 to rank the most important issues. Figure 2-1 summarizes these concerns into categories with relative percentages. While this sample is not statistically representative of the population of the surrounding neighborhoods, it is very useful for demonstrating the breadth of concerns neighbors have about the proposed commuter rail stop and TOD. This base of concern demonstrates that the surrounding neighborhoods are genuinely interested in doing what is right to preserve the unique community feel of the area while promoting improvements to safety, transportation, and economic development.

Approximately 10 people attended the meeting. The flyers, agenda, presentation materials, and handouts from the meeting are included in Appendix A.

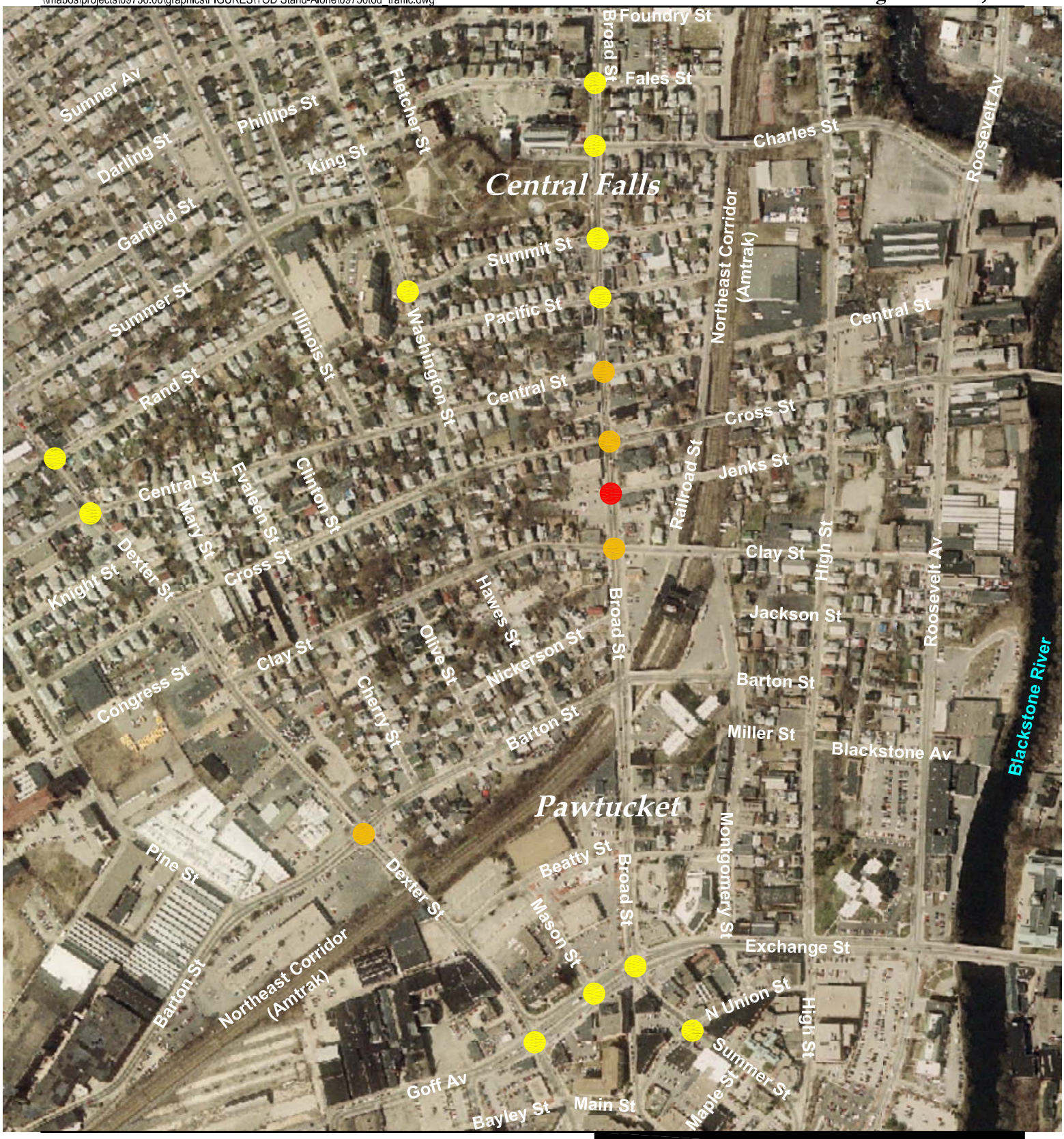
Figure 2-1: Summary of Survey Results by Category



The public was also invited to circulate through five informational tables. At the traffic and parking table, attendees were encouraged to talk about their concerns related to traffic congestion, driving speed, and on-street parking availability. The community learned about options for avoiding traffic congestion at TODs, such as minimizing commuter parking, improving pedestrian and bicycle access, de-emphasizing automobile access, accommodating bus access, providing a mix of uses nearby, and increasing density. Members of the community placed dots on a map of the study area to show the locations where they encounter the worst traffic congestion and parking problems, as well as where they would consider parking if the lots were publicly available. Figure 2-2 shows the identified traffic congestion areas, and Figure 2-3 shows the identified parking problems and potential parking areas.

Community comments at this table included:

- Intersections are wide and difficult for pedestrians to cross at Goff Avenue and Dexter Street, as well as at Broad Street, Goff Avenue, and Exchange Street.
- Barton Street between High Street and Broad Street is one-way and narrow. It's too narrow for two-way traffic and on-street parking.
- Synchronize traffic lights on Broad Street, Dexter Street, Goff Avenue, and Exchange Street to facilitate traffic flow away from the station.



0 250 500 Feet

- **Mild Congestion**
- **Moderate Congestion**
- **Heavy Congestion**

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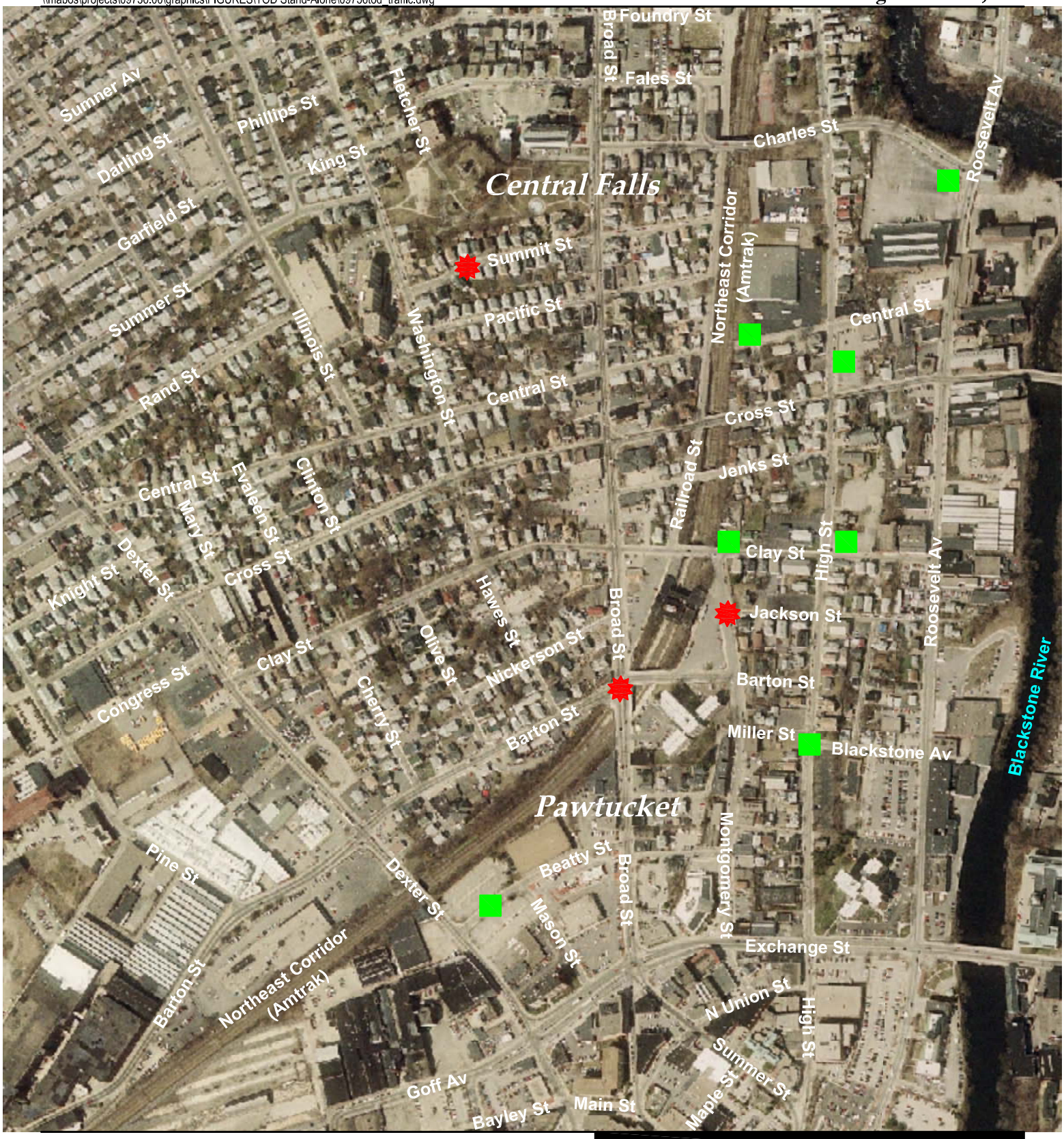
Figure 2-2

TOD Workshop #2
Traffic Congestion Areas



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Parking Problem Area

Potential Parking Area

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Figure 2-3

TOD Workshop #2
Parking Problem Areas
Potential Parking Areas

At the jobs and housing table, neighbors expressed concerns over needing more job opportunities and preventing gentrification from occurring after construction of a new train stop. They learned about existing and future efforts by the PCDC to build affordable housing in the neighborhood, as well as economic development tools such as zoning incentives, special districts, tax increment financing, neighborhood improvement bonds, and marketing programs.

The safety table, staffed by two Pawtucket police officers, addressed unsafe pedestrian environments and unsafe activity in the neighborhood. Safety near TODs can be improved by residents and businesses having their eyes on the street, developing a mix of uses to generate 24-hour activity, improving the pedestrian environment by eliminating dark or remote areas, and walking police patrols. The community identified the following issues that need improvement:

- Vagrants breaking into commuters' cars
- Poor sidewalk condition and street lighting
- Poor road condition from Clay Street to High Street
- Speeding through-traffic and trucks on Lonsdale Avenue

Community members placed dots on an aerial map to identify specific areas of concern. Multiple dots indicated and area concern, and have been used to rank locations in the following Table 2-2.

Table 2-2: Areas of Safety Concern

Degree of Concern	Location
Very Concerned	Empty lot between Conant Street, Mineral Spring Avenue, and Main Street
Very Concerned	Block south of Main Street between Roosevelt Avenue and School Street
More Concerned	Clay Street and Hawes Street
More Concerned	Railroad Street and Clay Street
Concerned	Railroad Street and Jenks Street
Concerned	Clay Street and Roosevelt Avenue
Concerned	Montgomery Street and Jackson Street
Concerned	Barton Street and Jackson Street
Concerned	Barton Street in general from Broad Street to Montgomery Street
Concerned	Northwest block at Dexter Street and Goff Avenue

The commuter rail stop information table included draft engineering drawings of the proposed commuter rail platforms and access stairs and elevators[2]. While area residents generally understand that the track curvature requires the platforms to be located north of the former station site, most wanted to see access to the platforms as close to the station as possible. Preference was given for connections at Clay Street versus Cross or Jenks Street, and most wished that any opportunity to connect directly into a redeveloped former station would be preserved. Feedback was generally positive and no negative comments were recorded.

The former station table contained architectural drawings and renderings of the former station site. The general layouts for station access were viewed favorably, and most attention focused on seeing something happen with the site as soon as possible. Many discussed the renderings of the planned convenience store development in the northwest corner of the site. Neighbors were generally pleased that new development was happening and that the new building would not block future access to the former station. Other topics discussed included the proposed narrowing of Broad Street, nearby development sites, the placement of trash dumpsters, and the number of parking spaces associated with the convenience store. Overall, attendees were positive that change was happening, and no notable negative comments were recorded.

Outreach Summary

The education and public participation piece of this analysis was conducted with two primary goals in mind:

- Involve the surrounding community in the decision-making process about TOD around the proposed commuter rail stop.
- Identify the largest concerns and hurdles to overcome from the best source available – the local neighborhood at the heart of the TOD.

Through a series of interviews and public workshops, the most important issues were identified, as summarized in Figure 2-1 above. It is apparent that the community is mostly concerned about retaining the quality and affordability of their community. Maintaining a focus on local concerns such as safety and security, good local jobs, affordable rents and housing, and preserving local community character dominated the responses heard during the workshops. Residents made it very clear that they do not want to see their neighborhoods become ancillary to new development in the area; rather, they want to make any new development an integral piece of their neighborhood that directly benefits and improves their daily lives.

[2] See Pawtucket/Central Falls Commuter Rail Facility Feasibility Study and Site Analysis Final Report Chapter 10 for detailed description of the proposed commuter rail platforms and access stairs and elevators.

As part of the workshops, case studies of existing and proposed TODs around the United States were shown in presentations and on poster boards in order to demonstrate their effects. A summary of these case studies can be found with the meeting minutes from the TOD workshops in Appendix A. Careful evaluations of the effects these TODs have had on their surrounding communities have been conducted to determine how jobs, housing, property values, safety, and traffic were impacted. While each TOD is unique with respect to size and location, many common principles for success have been documented. Several lessons relevant to Pawtucket and Central Falls are documented below in the "Recommended Improvements to Multi-Modal Network" and "Housing & Employment" sections.

The most important outcome of the outreach and education process was increased awareness both within the community and within Pawtucket and Central Falls government. All successful TODs in the United States have involved an open dialogue between government, developers, and the community through all planning and construction stages. Strong channels of communication and information sharing should be maintained as planning for TOD in Pawtucket and Central Falls continues.

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3

Parking and Traffic Analysis

An important part of successful TOD is proper control of parking supplies and traffic. An abundance of cheap or free parking encourages automobile use; for TOD, it is desirable to provide less parking than the development would normally require, increasing parking utilization and promoting transit use. The efficient flow of traffic at safe speeds is necessary for creating pedestrian-friendly and bicycle-friendly streets.

Parking Survey

A parking survey was conducted for the proposed site of the Pawtucket/Central Falls Commuter Rail Facility. The parking survey was conducted on May 30, 2007 between 9 AM and 4 PM. The parking survey was conducted in a one-quarter mile radius of the former station site. The survey area is shown shaded Figure 3-1.

The inventory did not include off-street public parking areas. The off-street parking in this area consists of private lots, serving the adjacent residential and commercial sites. There are no off-street parking areas available for general public parking.

There are a total of 561 on-street parking spaces within one-quarter of a mile of the proposed commuter rail stop, serving both the residential and the commercial land uses. The on-street parking spaces were identified on a block-by-block basis. The inventory revealed several locations with time-restricted on-street parking. A summary of the on-street parking is provided in Table 3-1. The block-by-block detail is included in Appendix B.

In the non-residential areas, there are street sweeping signs posted, which read "NO PARKING TOW ZONE, MONDAYS 8 AM TO 3 PM, APRIL-NOVEMBER, STREET SWEEPING." It appears that these signs are generally ignored by the public.

Figure 3-1: Parking Survey Area

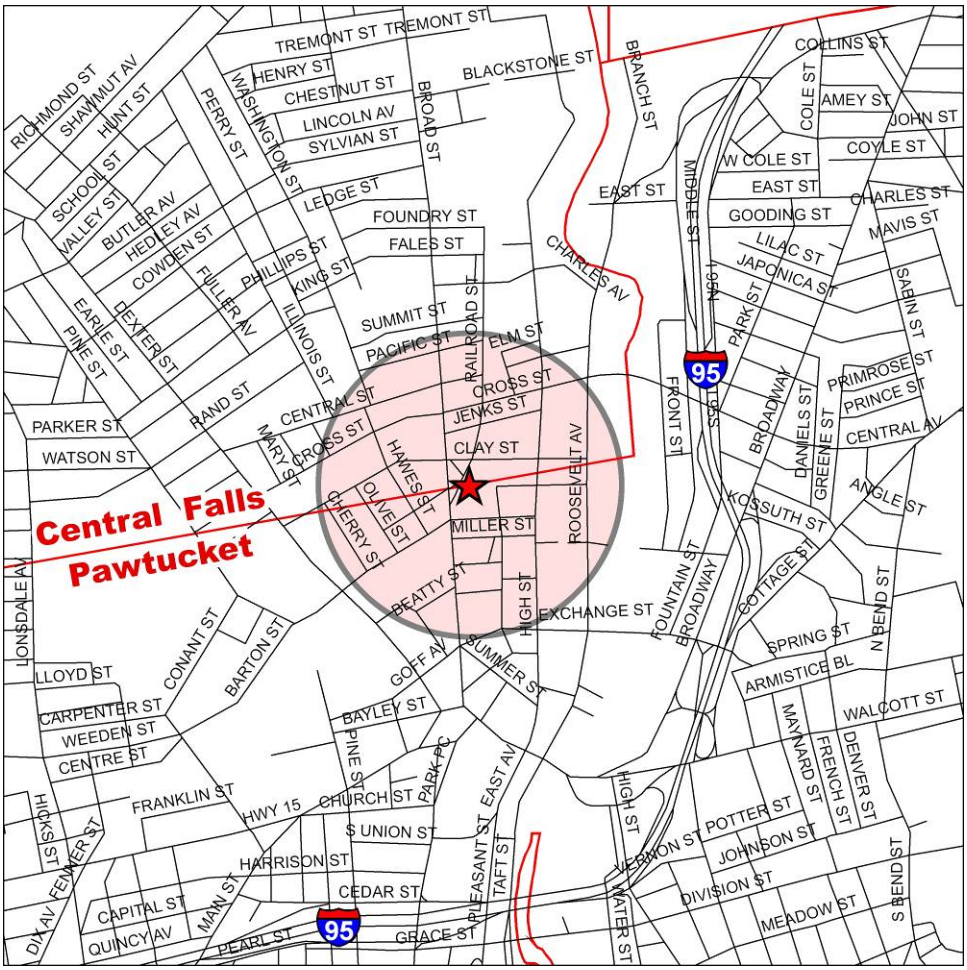

Table 3-1: Summary of On-Street Parking Inventory

Restriction Type	Number of Spaces
Unrestricted	445
15 Minute Parking	11
1 Hour Parking	49
90 Minute Parking	3
2 Hour Parking	32
3 Hour Parking	16
Handicap Parking Only	3
Nurses Parking Only	2
Total	561

Traffic Improvements

The Pawtucket/Central Falls Commuter Rail Facility Feasibility Study and Site Analysis Final Report contains the traffic inventory and analysis conducted to understand the impact of commuter traffic on local streets in Pawtucket and Central Falls[1]. This section uses the results of these analyses to identify conceptual improvements aimed at mitigating commuter traffic generated by the proposed commuter rail stop and addressing neighborhood concerns.

■

Potential Locations for Improvements

In selecting the locations for potential improvement, the results of the accident and capacity components of the traffic analysis were considered. Key intersections in the study area with accident rates greater than 1.5 accidents per million entering vehicles (MEV) were identified. Of these locations, intersections that would be affected by the proposed commuter rail stop were identified as potential improvement locations:

- Broad Street and Cross Street
- Broad Street and Clay Street
- Broad Street and Barton Street
- Barton Street and Dexter Street

Capacity analyses were conducted for key intersections in the study area for the projected 2010 traffic volumes with the proposed commuter rail stop at the former station site. Traffic signals were evaluated by Level of Service (LOS), a measure which assigns a letter grade between A and F to the signal based on the average delay experienced by motorists. The results of these analyses identified key intersections with poor projected LOS as potential locations for improvements:

- Broad Street and Clay Street
- Broad Street, Goff Avenue, and Exchange Street

Intersections were also identified as potential locations for improvements if LOS declined by more than one level. One intersection was identified:

- Broad Street and Cross Street

These locations correspond well with community input received at the public workshops. All of the locations recommended for improvements by the traffic analysis were identified as congested by the community in Figure 2-2.

[1] See Pawtucket/Central Falls Commuter Rail Facility Feasibility Study and Site Analysis Chapters 7 and 10 for detailed description of the traffic inventory and analysis.

■

Proposed Conceptual Traffic Improvements

A wide range of traffic improvements were considered for the locations cited in the previous section, including new or improved traffic signals, conversion of two-way streets to one-way streets, traffic signal coordination, the provision of additional capacity, and pedestrian improvements. The overall benefit to traffic operations of each improvement was assessed and the various improvements were compared. The improvements that achieved the greatest traffic benefit were recommended.

The proposed commuter rail stop is expected to draw traffic from many directions. The trips are distributed fairly evenly in a radial manner, so the impact of the additional traffic is also fairly evenly dispersed (see Appendix B for detail). There is not any one area of the City street system that bears the majority of the burden. As a result, traffic operations in the project area are generally at an adequate LOS for an urbanized area despite the additional traffic expected to be generated by the commuter rail stop. There are two intersections with poor levels of service and improvements are recommended at each of these intersections.

Broad Street, Goff Avenue, and Exchange Street

The intersection of Broad Street, Goff Avenue, and Exchange Street is expected to operate at LOS E during the peak hours with the commuter rail stop traffic. This intersection carries large volumes of traffic. With the exception of the Broad Street southbound approach, each approach has at least two approach lanes. If the Broad Street southbound approach were widened to accommodate two approach lanes at this intersection, the overall intersection LOS would improve to LOS C. Therefore, this improvement is recommended. Traffic improvements at this intersection should be coordinated with pedestrian improvements, such as median refuges and tighter corner radii, so that the character of the intersection is improved for all users. Note that right-of-way may be required to implement this traffic improvement.

Broad Street and Clay Street

The intersection of Broad Street and Clay Street is currently unsignalized and the Clay Street approach is expected to reach capacity by 2010. With the addition of commuter rail stop traffic, the Clay Street approach would be reduced to LOS F. Signalization was considered at this intersection. The Federal Highway Administration (FHWA) publishes warrants for the installation of traffic signals in the Manual on Uniform Traffic Control Devices (MUTCD). The warrants are based upon a variety of factors including traffic volumes, lane arrangements, speed, pedestrian activity, systems, and accident history. Due to the limited data available for this location, all of the warrants could not be evaluated. The intersection does

meet the Peak Hour Warrant based upon the 2010 peak traffic volumes with the commuter rail stop. Given that the Peak Hour Warrant is met and that the intersection could operate as part of a coordinated signal system, traffic signal installation is recommended for Broad Street and Clay Street.

Signal Coordination along the Broad Street Corridor

Clay Street intersects Broad Street between two signalized intersections; Broad Street and Barton Street, and Broad Street and Cross Street. The three intersections were evaluated for signal coordination. Coordinatability analysis reports were run for these intersections. Coordinatability factors, ranging from 0 to 100, are a means of evaluating the benefit of connecting a series of traffic signals to work together. Higher factors indicate more beneficial coordination. Coordination is generally recommended for locations with coordinatability factors greater than 50. The factors are based on a number of elements including travel time, storage space, main street volume, cycle lengths, and the proportion of traffic in the group that gets all green signals. The coordinatability factors for these intersections were between 65 and 81 in the AM peak hour and between 70 and 100 in the PM peak hour. Based upon these results, signal coordination on Broad Street at Barton Street, Clay Street and Cross Street is recommended.

Community Traffic Concerns

The improvements described in the preceding sections would address many of the traffic concerns brought up by the public at the TOD workshops. The community considers Broad Street to be the most congested roadway in the neighborhood, especially the section between Central Street and Clay Street. The proposed signal coordination would specifically address traffic on this section of Broad Street. Improvements are also recommended at the intersection of Broad Street, Goff Avenue, and Exchange Street, another intersection about which the community voiced concerns.

The locations of the recommended conceptual traffic improvements are presented in Figure 3-2. The improvements were evaluated in terms of capacity analyses. The results were compared to the previously projected LOS and are shown in Table 3-2.

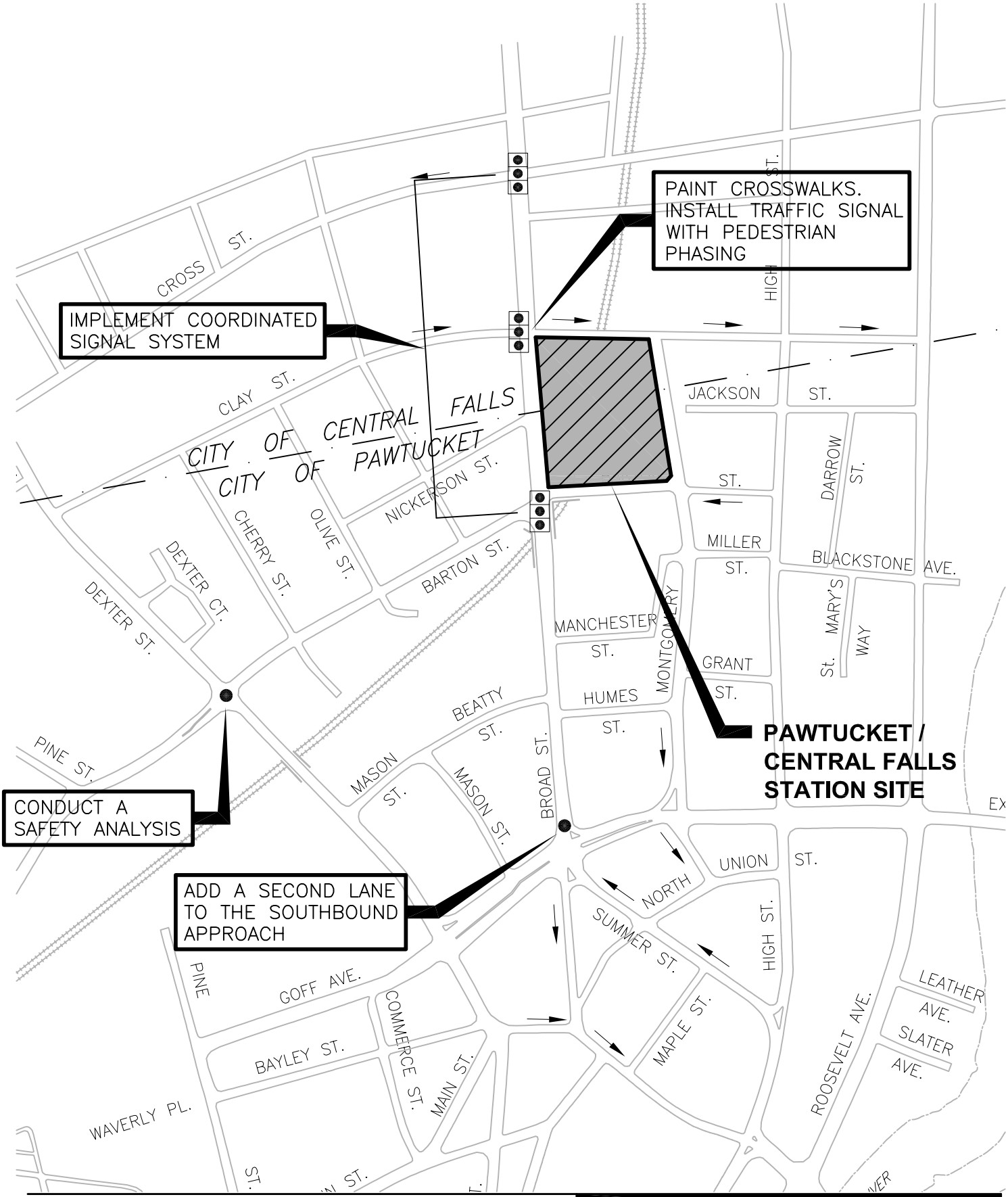

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Figure 3-2

Conceptual Traffic Improvements

Table 3-2: Summary of Signalized Intersections Capacity Analysis (2010, with Pawtucket/Central Falls Commuter Rail Stop)

Signalized Intersections	AM Peak		PM Peak	
	without improvements	with improvements	without improvements	with improvements
Broad Street & Cross Street				
Cross Street WB	C/21.7	E/78.1	C/28.7	E/77.5
Broad Street NB	D/45.3	D/47.1	E/64.9	D/36.2
Broad Street SB	B/12.2	A/9.9	B/11.6	B/12.6
Overall Intersection	C/26.4	D/37.9	D/37.0	D/36.2
Broad Street & Clay Street				
Clay Street EB	unsignalized	C/25.6	unsignalized	C/31.2
Broad Street SB	intersection	A/3.6	intersection	A/8.1
Broad Street NB		A/5.8		A/5.5
Overall Intersection		A/9.3		B/10.0
Broad Street & Barton Street				
Barton Street EB	B/17.5	B/18.1	C/20.2	C/33.2
Barton Street WB	B/13.1	B/13.7	B/13.4	B/18.0
Broad Street NB	B/10.3	B/17.9	B/11.4	B/15.7
Broad Street SB	B/13.3	B/11.9	C/24.8	B14.5
Overall Intersection	B/12.9	B/15.7	B/18.6	B/19.0
Broad Street & Goff Ave/ Exchange Street				
Goff Ave EB	C/33.5	C/27.3	B/13.5	B/11.8
Exchange Street WB	D/54.8	C/20.8	D/35.9	C/31.9
Broad Street NB	E/71.6	C/33.8	F/102.7	D/39.9
Broad Street SB	E/76.6	D/50.9	F/114.3	D/50.2
Overall Intersection	E/58.0	C/32.5	E/76.7	D/36.3

As the results indicate, the recommended improvements result in adequate levels of service at these intersections based on 2010 traffic volumes with the commuter traffic. Note that the signal coordination on Broad Street at Barton Street, Clay Street, and Cross Street results in a slight decrease in overall LOS at Cross Street. The timings of the coordinated signal system are set to optimize the main street traffic flow. Sometimes, the traffic operations of the minor street are sacrificed for the good of the arterial flow when a system is coordinated. The benefit to LOS on Broad Street through the coordinated signal system is shown in Table 3-3.

Table 3-3: Broad Street – Arterial Level of Service

	Without Improvements		With Improvements	
Time Period	Northbound	Southbound	Northbound	Southbound
AM Peak Hour	LOS D	LOS D	LOS D	LOS C
PM Peak Hour	LOS E	LOS E	LOS D	LOS C

Additional improvement concepts were considered. For example, the conversion of two-way roadways to one-way traffic would consolidate conflict points and allow more on-street parking. However, the commuter

benefits of such conversions are outweighed by the impacts to the surrounding community.

While most of the recommended improvements were identified based upon the results of capacity analyses, improvements were also considered for intersections with a high occurrence of accidents. As discussed previously, four intersections were identified as potential improvement locations based upon the accident rates. Improvements have already been proposed at three of these intersections based on capacity considerations: Broad Street and Barton Street, Broad Street and Clay Street, and Broad Street and Cross Street. These three intersections are in close proximity to the proposed commuter rail stop and would be affected by the traffic generated by commuters.

The fourth intersection with a high accident rate is Barton Street and Dexter Street. The community also identified this intersection as a location of moderate congestion. Although this intersection is not in the immediate proximity of the proposed commuter rail stop, it would carry some additional traffic generated by the stop. The additional traffic does not reduce the intersection LOS (see Appendix B). Based on the existing conditions and accident history, further study of Barton Street and Dexter Street is recommended. Collision diagrams should be prepared to determine whether there are discernable patterns of accidents at this location. The need for additional study at this intersection is not a result of the proposed commuter rail stop, so no improvements are proposed in this study.

4

Designing For Multimodal Streets

The transportation network associated with a TOD must be carefully balanced to create a safe and inviting environment for non-motorized transportation modes and buses. Walkable environments include not just sidewalks, but elements like seating, signage, and trees that make the area inviting. To help plan this environment, the team analyzed road networks and current traffic data to map locations for pedestrian and bicycle networks.

Existing Pedestrian Network

Pedestrian access maintains the urban vitality needed to support the dense mixed-use character and high transit ridership that mark a thriving TOD. Successful pedestrian networks offer high-level service in four key measures:

- Safety: Keep vehicle speeds, pedestrian exposure to traffic, and vehicle volumes down to levels that reduce conflicts between cars and people.
- Convenience: Delineate clear paths to the commuter rail stop through design features and helpful wayfinding.
- Comfort: Provide adequate walking paths and sidewalks.
- Attractiveness: Draw people in by providing use, beauty, and company.

Currently, the study area contains a dense network of sidewalks and crosswalks that facilitates pedestrian movement. Sidewalks are continuous, and several major sidewalks feature attractive brick borders that enhance the pedestrian environment. However, some key deficiencies exist:

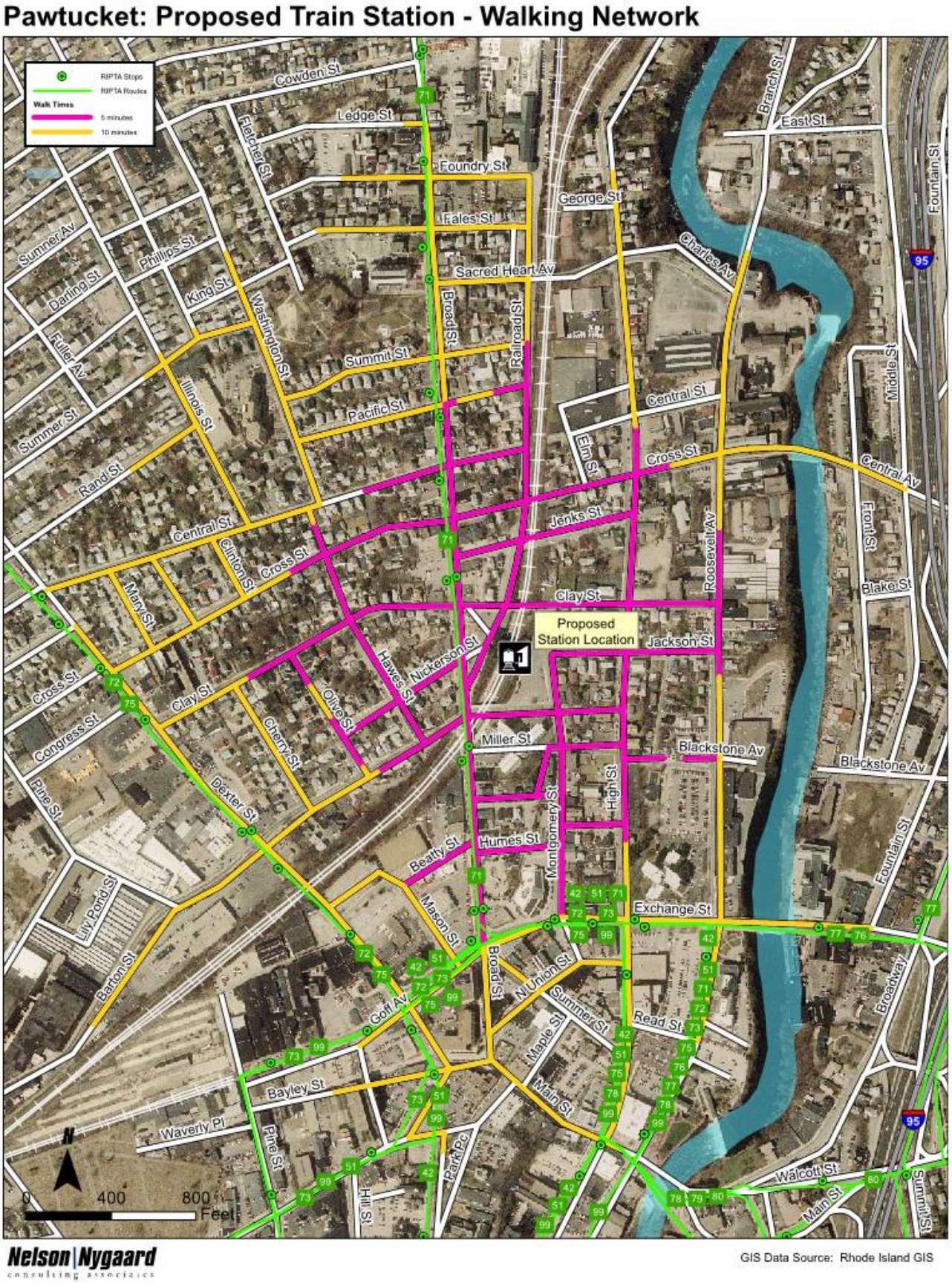
- ADA-compliant curb ramps are not found at all intersections. This presents challenges for those with mobility impairments.
- Some crosswalk markings are occasionally worn away or missing.
- Motorists often disobey the law and fail to yield to people in crosswalks.

Table 4-1 is an inventory of sidewalk conditions on most local streets near the former station site. Figure 4-1 shows walking distances around the site.

Table 4-1: Sidewalk and Crosswalk Conditions

	Crosswalks				Sidewalks		
Street	Location	Striping	Condition	Ped Signals	Condition	Curb Ramp	ADA Compliance
Broad (north - south)							
Cowden - Charles/Sacred Heart	Cowden	standard	Needs repainting	none (flashing yellow traffic lights)	Good	Y	Y
	Ledge	zebra	Needs repainting	none	Good	Y	Y
	Foundary	zebra (west side broad only)	Needs repainting	none (stop sign)	Good	Y	Y
	Fales	standard, 4-way	Needs repainting	signalized walk	Good	Y	Y
	Sacred Heart/Charles	none	NA	none	Good	Y	Y
Charles/Sacred Heart - Summit	Cross	Standard	Needs repainting	signalized walk			
Summit - Clay	Clay	Standard					
Clay - Barton	Barton	standard, 4-way	Good	signalized walk			
Barton - Grant	Grant						
Grant - Humes	Humes	zebra, standard, 2-way	Good	none			
Humes - Exchange	Exchange	zebra	Good	signalized walk	Good	Y	Y
Exchange - Main	Main	standard	Good	none	Good	Y	Y
High Street (north - south)							
Charles - Cross	Charles	standard	needs repainting	none (traffic lights)	Good	Y	Y
	Central	standard	Good	none	Good	Y	Y
Clay - Jackson	Cross	standard	needs repainting	none (traffic lights)	Good	Y	Y
Jackson - Miller mid-block	Jenks	standard, 2-way E - W			Good	Y	Y
Miller mid-block - Exchange	Clay	standard	needs repainting	none (stop sign)	Good	Y	Y
Exchange - Main	Miller	standard	needs repainting	none	Good	Y	Y
Main - East					Good	Y	Y
Railroad St (north - south)							
Foundry (deadend) - Central (deadend)					Good	N	Y
Dexter (north - south)							
Garfield - Cross	Mowery	standard	good	none (traffic light)	Good		Y
	Rand	standard	good	none	Good		Y
Cross - Goff (Exhange)	Cross	standard, 4-way	needs repainting	none (traffic light)	Good		Y
	Barton	standard, 4-way	good, textured paving	signalized walk	Good		Y
Roosevelt Ave (north - south)							
Charles - 1/2 to Central	Charles (mid-block)	zebra	good	signalized walk	Good	Y	Y
1/2 to Central - Jackson	Cross	standard	needs repainting	none	Good	Y	Y
Jackson - Exchange	Blackstone	standard	needs repainting	none	Good	Y	Y
	Mid-block btw Blackstone & Exchange	zebra, ped crossing yellow triangle sign	good	signalized walk	Good	Y	Y
Exchange - Main	Exchange	standard, 4-way	good	signalized walk	Good, brick paving and concrete	Y	Y: ramp from river to sidewalk
	Police Station (mid-block)	standard w/ brick paving	good	signalized walk			
	mid-block btw Main & Exchange	zebra	good	none			
	Main	standard, 4-way	good	signalized walk			
Exchange St (east-west)							
Roosevelt - High	High	standard, 4-way	good	signalized walk	Poor	Y	N: not always 3ft clearance, trees uprooting sidewalk
High - Montgomery	Montgomery	standard, 4-way	good	signalized walk	Good	Y	Y
Montgomery - Broad	Broad/Summer	standard, 5-way	good	signalized walk	Good	Y (North) N (South)	N: on south no continuous sidewalk path
Broad - Dexter	Dexter	standard, 4-way	good	signalized walk	Good	Y	Y
Main St (west - east)							
Dexter - Broad	Dexter	standard, 4-way	good	signalized walk	Good	Y	Y
Broad - Maple	Broad	standard	good	none	Good	Y	Y
Maple - High	Park Place	standard	good	none	Good	Y	Y
High - Roosevelt	Maple	standard & zebra, 3-way	good	none	Good	Y	Y
	High	standard, 4-way	good	signalized walk	Good	Y	Y
Clay St (west - east)							
Dexter -Broad	Dexter	zebra, 3-way	good	none	Good	N	N: not always 3 ft clearance
Broad - High	Broad	standard, 2-way	needs repainting	none			
Central St (west - east)							
Dexter - Railroad st (deadend)	Broad	standard	needs repainting	none			
Railroad tracks - High	High	zebra, 4-way	good	none			
Cross St (west - east)							
Dexter - Broad	Dexter	standard, 4-way	needs repainting	signalized walk	Good	Y	Y
Broad - High	Hawes	standard	needs repainting	none	Good	Y	Y
High - Roosevelt	Broad	none	NA	signalized walk	Good	Y	Y

Figure 4-1: Pawtucket/Central Falls Walking Network



Existing Bicycle Network

Integrating bicycles is beneficial for transit-oriented developments, as bicycles increase travel options in a low-cost and low-impact manner. There are three fundamental components to integrating bicycles into TOD:

- Bicycle network connections: TOD stations must be woven into the bicycle network, which may include on and off-street routes.
- Safe storage: Include safe and secure bicycle parking at stations so that riders can lock up their bikes at the station.
- Bikes on transit: Ensure that bicycles can be brought on board transit so that they may be used at both ends of a journey. RIPTA sponsors a Rack n' Ride program, with racks fitting two bikes on each of its buses, a good way of encouraging bicycle use. The MBTA allows bikes on the commuter rail, but not during rush hour trips.

Currently, bicycle accommodation is adequate throughout most of the study area. Traffic volumes are moderate and street widths are adequate to accommodate both motorists and bicyclists. However, some key bicycle accommodations are lacking. For instance, there is a lack of designated bicycle facilities on some of the more heavily-traveled key routes, and "share the road" signage is lacking throughout the study area. Additionally, bike parking is often insufficient at key bicycle destinations.

Existing Transit Access

Aside from cars and walking, people should also be able to access the commuter rail stop via transit, with easy transfers between RIPTA buses and the commuter rail. Current RIPTA service past the train station on Broad Street is provided by route 71, which connects at Main and Roosevelt to the 99 Pawtucket bus to Providence. Several other bus lines run within a 10-minute walk of the proposed commuter rail stop, as shown in Figure 4-2.

Figure 4-2: Transit Frequencies in Study Area

An inventory of bus stops within the study area was conducted in the field. The results are listed in Table 4-2 below.

Table 4-2: Transit Stops in Study Area

Street	Location	Side	Shelter	Location	Side	Shelter
	Northbound Service			*Southbound Service*		
Broad Street	Btw Barton Street and Humes Street	Far	Y	Sheridan Street	Near	N
	Sheridan Street	Far	N	Sacred Heart Avenue	Far	N
				Pacific Street	Near	Y
Roosevelt Avenue	Main Street	Far	Y	Main Street	Near	Y
Dexter Street	Andrew Ferland Way	Far	N	Mowry Street	Far	N
	Barton Street	Far	Y	Cross Street	Far	
	Central Street	Near	N	Goff Avenue	Far	
	Rand Street	Near	N			
	Garfield Street	Far	N			
Park Place				Church Street		Y
	Eastbound Service			*Westbound Service*		
Exchange Street	Main Street	Far	Y	Main Street	Near	Y
	Summer Street	Far	Y	Broad Street	Far	Y

5

Recommended Improvements to Multimodal Network

A successful TOD starts at the focus of activity, which is the public transit stop. The stop must be accessible to pedestrians, bicycles, buses, and cars in order to integrate it effectively into the surrounding neighborhood and promote successful TOD, safe spaces, and positive reinforcement of the existing built environment. Many train stations that have been built in existing neighborhoods are completely out of character with their surroundings. A successful station includes compatible architectural elements, similar scales to adjacent buildings, pedestrian-friendly and transparent facades on all sides, and welcoming entries near all possible points of approach by all modes of transportation.

The design of the commuter rail access points and the possible use of the former station site have not been finalized, but these principles should be followed to the greatest extent feasible. The goal is to create a great place in the community, not a stand-alone incongruous structure.

Pedestrian Network

Clear pedestrian access to the station area is critical to the success of TOD. In order to create a welcoming, active environment to support safe residential areas and local supporting retail activity, pedestrians must find walking to and from the station an easy, pleasurable, and straightforward experience. This will be especially important to the success of transit if construction of a parking garage is deferred at a Pawtucket/Central Falls commuter rail stop, as many riders would access the station by walking from home or from nearby surface parking. Several pedestrian accommodation principles should be followed in the study area. These principles are described below.

Circulation

The needs of all users should be factored into a circulation plan for the study area. This includes all modes of transportation, including pedestrians. Pedestrians should have a well defined sidewalk or path network and frequent opportunities for crossing at designated intersection and mid-block crosswalks.

Balance

All features of the street network should work together to balance the needs of all users: motorists, pedestrians, and bicyclists.

Connectivity

The roadway system should provide overall connectivity. For pedestrians, this means a continuous sidewalk or side-path network with frequent street-crossing opportunities, so that pedestrians do not need to travel out of their way to reach destinations. Once a pedestrian has reached a crosswalk, a series of design characteristics should be followed:

- Clarity: The crosswalk should make it obvious to motorists that pedestrians should be expected, and pedestrians should be guided to the designated crosswalk.
- Predictability: Crosswalk placement should be predictable, and should be more frequent with increased proximity to the commuter rail stop, where more pedestrians would be expected to cross.
- Visibility: In the TOD area, crosswalks should be clearly marked, signed, and illuminated so that motorists and pedestrians are visible to each other.
- Limited Exposure: There should be limited conflicts with traffic, and crossing distances should be reasonably short. Crossing distances can be reduced through the incorporation of curb extensions or pedestrian refuges.
- Clear Crossing: The crosswalk should be free of all obstacles or hazards and accessible to all users.

Safety

To maximize safety, optimal vehicle speeds should be 20 mph, with a posted speed limit of no greater than 25 mph. Features that can encourage adherence to posted speed limits include:

- Rigorous enforcement of existing speed limits
- Utilization of portable or permanent radar devices that show the posted speed limit and motorists' actual speeds
- Traffic calming features such as narrowing the roadway and including curb extensions, center medians, and on-street parking
- Striping or other visual treatments to visually reduce travel lane widths, including bicycle lanes, curb lines, and other innovative treatments

Sight distance and sight lines are another consideration. Vehicles parked near crosswalks create sight line restrictions. To resolve this issue, a minimum no-parking zone of 20 feet on the near and far sides of the crosswalk is recommended at all intersection legs. This no parking zone can also be created by curb extensions, which physically prohibit vehicles from parking too close to the crosswalk, and also allow pedestrians to step out into the intersection to see around parked cars. Curb extensions also reduce crossing distance, which improves pedestrian compatibility.

Ensuring adequate lighting is another crucial component of providing adequate pedestrian safety. Lighting should be placed at regular intervals along a roadway to provide a uniform level of light, and should be present at all crosswalks to maximize pedestrian visibility. In TOD districts, pedestrian-scale lighting should be considered to increase security and create a sense of place.

Design elements such as shorter blocks, narrower rights-of-way, curb extensions at intersections, less frequent curb-cuts, and driveways that give visual emphasis to the continuation of the sidewalk are a few basic design elements that can minimize pedestrian risk exposure. Vehicle turns should be minimized along key pedestrian routes to prevent conflicts. Transportation Demand Management (TDM) can be effective in managing auto traffic volumes in TOD districts.

Accessibility

The needs of all users should be accounted for when designing pedestrian facilities. This means that all Americans with Disabilities Act (ADA) requirements must be met and that the needs of individuals with mobility limitations are given proper consideration. This is particularly critical in curb ramp and driveway design.

Traffic Engineering Elements

Traffic elements such as traffic and crosswalk signals, crosswalk and curb ramp treatments, and signal timings should be designed with pedestrians in mind to maximize convenience, comfort, and safety. Cycle lengths should be minimized so that pedestrians do not have to wait an unreasonably long time to cross a street. Crossing times should also be adequate to allow pedestrians to cross a street in a practical amount of time (assuming the average pedestrian walks at 4 feet per second).

The use of concurrent and protected pedestrian crossing phases is preferred over push-button actuated pedestrian phases that can cause significant delays to pedestrians. Concurrent pedestrian crossing occurs where pedestrians and cars moving in the same direction go at the same time, while protected pedestrian crossing occurs where pedestrians receive a “Walk” light only when there are no vehicle conflicts. Any concurrent phase should also have a leading pedestrian interval (LPI), meaning that the pedestrians receive a “Walk” light a few seconds before traffic moving in the same

direction receives a green light. This allows pedestrian to begin crossing the intersection before turning vehicles create conflicts. Where concurrent or protected phases are not feasible, exclusive pedestrian phases should be accommodated on recall without the use of actuation buttons.

Landscaping and Aesthetics

Aesthetics play an important role in supporting TOD. Sidewalks and plazas should be visually appealing and physically inviting. Appealing streetscape design can be an effective means of announcing the uniqueness of the TOD environment and encouraging initial visits to the area. When combined with quality land uses, aesthetics play an important role in drawing and maintaining the more crowded urban vitality that marks successful TOD.

Convenience

Pedestrian walkways leading to the commuter rail stop should be well-maintained, safe, and well-lit. They should be sufficiently broad to comfortably handle the expected pedestrian traffic volumes. Signage should be adequate to lead individuals, especially those unfamiliar with the area, to the stop. Pedestrian levels of service along connecting routes between major origins and destinations should be emphasized. TOD development should provide the local community with daily needs, minimizing regular out-of-area trips for goods and services and minimizing automobile usage. TOD development should be mixed-use to maximize the opportunity to run several errands on one trip and encourage longer area visits. Different uses should also be strategically placed to maximize pedestrian-trip efficiency, such as locating dry cleaners and day care facilities near transit nodes.

Comfort

Sidewalks should be wide enough for two pedestrians to walk abreast. The minimum width for two people to walk comfortably side by side is about 5 feet. For strolling pairs to be able to pass each other in stride, a minimum of 10 feet of sidewalk width is necessary. In places defined by high pedestrian volumes and buildings that directly abut sidewalks, widths up to 20 feet are commonly recommended, though a more modest width of 10-15 feet can add a sense of vitality. Places to sit and to wait are also a key component of a pedestrian friendly environment. Figure 5-1 shows an example of sidewalks in an urban village.

Figure 5-1: Adequate Sidewalk Width in Urban Village

Fair Lawn, New Jersey

Examples & Resources:

1. Calgary, Alberta - The City of Calgary's "TOD Policy Guidelines"[1] provides detailed principles on pedestrian access in its "Pedestrian Oriented Design" section including:

- Providing quality pedestrian connections
- Emphasizing a compact development form
- Locating pedestrian-oriented uses at the ground level
- Producing architecture on a human scale
- Incorporating all-season design

2. Kansas City, KS – The city developed a pedestrian Level of Service model based on five measures[2]:

- Directness – pedestrian connections between key destinations and transit
- Continuity – conditions of pedestrian pathways
- Street Crossings – ease and safety of pedestrian crossings
- Visual Interest and Amenity – aesthetics and environment
- Security – lighting and sight lines

■

Possible Pedestrian Network Improvements

Specific locations for pedestrian improvements may change as concept plans are developed and shared with stakeholders, residents, and business owners. A few areas are primary candidates for future infrastructure planning.

[1] Available at City of Calgary website at: http://www.calgary.ca/DocGallery/BU/planning/pdf/tod/tod_policy_guidelines.pdf

[2] From the Kansas City Walkability Plan, available at: http://www.kcmo.org/planning.nsf/plnpres/walkability

Broad Street between Summit Street in Central Falls and Exchange Street in Pawtucket

Broad Street serves as the primary corridor for connections between downtown Pawtucket and Central Falls, has existing bus service, and conveniently passes in front of the proposed commuter rail stop. It contains many retail establishments, as well as several parcels available for commercial or residential TOD. Sidewalks exist on both sides for its entire length, and most street crossings have pedestrian signals, wheelchair ramps, and marked crosswalks.

Broad Street is important for the success of TOD in the study area because it handles a mix of modes of transportation and has a mix of land uses. Pedestrian amenities along Broad should be well-maintained and repaired where needed. Stronger safety features should be installed, including wide international-standard or "zebra" crosswalk bars, LED countdown pedestrian signals, detectable warning panels on wheelchair ramps, and pedestrian-level lighting. This should be supplemented by street trees, benches, and trash receptacles where width permits. On-street parking should be allowed at all possible locations to buffer pedestrians from vehicle traffic. A clear wayfinding system should also be installed on Broad Street. A sample wayfinding sign is shown in Figure 5-2.

Figure 5-2: Wayfinding Map

Philadelphia, PA (Michael King)

Two locations represent significant barriers to pedestrians on Broad Street. Pedestrian crossing at Exchange Street is difficult due to the size and configuration of this intersection. A pedestrian safety analysis of this intersection should be conducted. Some possible improvements include median refuges, reduced corner radii to slow right-turning vehicle speeds, placing the pedestrian phase on recall, or accommodating concurrent crossings with an LPI, depending on left-turn volumes. Since this intersection is a critical link at the gateway to downtown Pawtucket, every effort to improve its pedestrian amenity should be taken.

The Broad Street bridge across the railroad tracks is an intimidating environment for pedestrians due to the wide roadway, lack of protection from passing cars, and lack of spatial enclosure. Efforts should be taken to improve this bridge by allowing on-street parking, adding lighting, and providing wayfinding or other informational signing that can also add color and interest to the bridge. Pedestrian improvements to the bridge will be helpful for TOD, as the bridge must be used to access some of the closest retail destinations from the former station site.

Barton and Clay Streets between Dexter Street and High Street

Barton and Clay Streets are important east-west connections between nearby residential neighborhoods and the proposed commuter rail stop. While other neighborhood streets approach the stop, these streets extend further into the surrounding residential areas. Existing and new housing along each street are served by good sidewalks, but lighting is a concern on parts of Clay Street. Both streets experience a fair amount of vehicle traffic, and each has a sidewalk directly against the vehicle travel lane. Efforts should be taken to improve the quality of these connections through street trees, lighting, additional on-street parking, and wider sidewalks.

Montgomery Street

The built character and pedestrian amenities of Montgomery Street make it the most leisurely connection between downtown Pawtucket and the commuter rail stop. However, the viability of this street as the most direct connection is hindered by safety concerns and the poor vista at the southern end of the street. Residents have expressed concern about illicit activities on Montgomery Street. If the former station site is revitalized, this will create an active destination in view of much of the street, which will help alleviate safety concerns. The southern end of the street, which terminates in the middle of a built block on North Union Street, should be improved through creative signing, lighting, and building fenestration to direct pedestrians to High or Summer Streets. Marketing features of the downtown arts district should be utilized to help improve this terminus.

Bicycle Network

While bicycle use in the study area today is low, most successful TODs see a significant increase in bicycle activity as a result of the improved accommodations and mix of nearby uses. Every effort should be taken today to safely accommodate bicycles on most roadways. The following principles should guide bicycle accommodation in a TOD.

Connecting Transit to Bikes

Dedicated bicycle facilities should connect to the commuter rail stop, but not conflict with pedestrian movements. Signage near the stop should direct

cyclists to bike parking, local points of interest, and distant destinations, in much the same way that wayfinding is provided for pedestrians and drivers.

Maps and information kiosks are useful at disseminating information. The transit map should contain information about bicycle facilities; the local bicycle map should show where the transit stops and lines are. The goal is one map per journey, not one map per mode. A sample bike and transit map is shown in Figure 5-3.

Figure 5-3: Bike and Transit Map

Chicago, IL Bike Map
Note: the map identifies preferred bike routes, transit services and transit stations that offer secure bike parking.

Bike Parking

Lack of secure parking keeps many people from using their bikes for basic transportation. Leaving a bicycle unattended, even momentarily, is not an option for most urban bicyclists. A bike rack that doesn't work or isn't conveniently located discourages future bike use. The design and placement of appropriate bicycle parking should be incorporated into TOD planning throughout the study area, as well as at the commuter rail stop. This can include special zoning requirements for the provision of bike storage for new developments, including locker and shower facilities at larger employers. Bike racks should be as close as possible to the commuter rail stop and the front door of businesses for security and convenience. Figure 5-4 shows an example of a bike parking facility at a transit stop.

Figure 5-4: Bike Parking at Transit

Washington, DC

Shared-Use Lanes

Shared-use lanes are an effective method for designating bicycle routes to and from a transit stop in urban downtowns like Pawtucket and Central Falls. Signing and chevron pavement markings are easy retrofits that provide great value to bicyclists and motorists, especially where full bike lanes cannot be accommodated in the available right-of-way.

The American Association of State Highway and Transportation Officials (AASHTO) Guide for the Development of Bicycle Facilities describes signed shared roadways (bike routes) as "those that have been identified by signing as preferred bike routes" and goes on to describe the reasons why routes might be so designated:

- Continuity between bicycle lanes, trails, or other bicycle facilities
- Marking a common route for bicyclists through a high-demand corridor
- Directing cyclists to low-volume roads or those with a paved shoulder
- Directing cyclists to particular destinations (e.g. park, school or commercial district)

In addition, designation indicates that there are particular advantages to using the route rather than an alternative. It is important to note that signed shared roadways generally do not succeed in diverting cyclists away from routes that are more direct, faster, and more convenient, even though they may be on quieter streets. Indeed, the Oregon Department of Transportation (ODOT) bicycle manual graphically shows how such efforts can actually create greater danger and inconvenience for bicyclists by requiring them to cross major roads just to use a designated bicycle route. ODOT goes on to say:

> "Directional signs are useful where it is recommended that bicyclists follow a routing that differs from the routing recommended for motorists. This may be for reasons of safety, convenience, or because bicyclists are

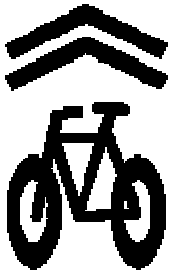
banned from a section of roadway (the routing must have obvious advantages over other routes)."

The AASHTO guide recommends considering a number of factors before signing a route:

- The route should provide through and direct travel.
- The route should connect discontinuous segments of shared use paths or bike lanes.
- Bicyclists should be given greater priority on the signed route than on the alternate route.
- Street parking should be removed or limited to provide more width.
- A smooth surface should be been provided.
- Regular street sweeping and maintenance should be assured.
- Wider curb lanes should be provided, as compared to parallel roads.
- Shoulders should be at least four feet wide.

In all cases, shared use roadway signing should include information on distance, direction, and destination, and should not end at a barrier such as a major intersection or narrow bridge. Figure 5-5 shows an example of pavement markings.

Figure 5-5: Shared Use Bike Marking



Bike Lanes

In several locations within the study area, bike lanes are a preferable method for safely defining bicycle routes, especially close to the former station site on Broad Street. The designation also has the advantage of reducing through vehicle speeds by better defining the vehicle travel lane. Bike lanes are defined as "a portion of the roadway which has been designated by striping, signing, and pavement marking for the preferential or exclusive use by bicyclists". Bicycle lanes make the movements of both motorists and bicyclists more predictable and, as with other bicycle facilities, there are advantages to all road users in striping lanes on the roadway.

Bicycle-friendly cities such as Madison, Eugene, Davis, Gainesville, and Palo Alto have developed extensive bike lane networks since the 1970s. More

recently, large cities such as Tucson, Chicago, Houston, Philadelphia, Portland, and Seattle have begun to stripe bike lanes on their arterial and collector streets as a way of encouraging bicycle use.

In general, bicycle lanes should always be:

- One-way, carrying bicyclists in the same direction as the adjacent travel lane
- On the right side of the roadway
- Located between the parking lane (if there is one) and the travel lane

Critical bike facility dimensions

- 4 feet (1.2m): minimum width of bike lane on roadways with no curb and gutter
- 5 feet (1.5m): minimum width of bike lane when adjacent to parking, from the face of the curb or guardrail
- 11 feet (3.3m): shared bike lane and parking area, no curb face
- 12 feet (3.6m): shared bike lane and parking area with a curb face

Examples & Resources:

1. Metro Commuter Services, St. Paul, MN - installed bicycle lockers for safety and protection from inclement weather.
2. CalTrans operates a highly successful bikes-on-board program. It is so popular that requests for more access are driving equipment purchase decisions, see http://www.caltrain.com/caltrain_bike_FAQs.html.

■

Possible Bicycle Facility Improvements

Biking should be encouraged and made safe on every street within the study area. A few key connections to surrounding neighborhoods should be emphasized.

Broad Street

As the primary connection through Central Falls, past the former station site and proposed commuter rail stop, and into downtown Pawtucket, Broad Street is a natural and necessary connection for bicyclists to and from the stop. The higher vehicle volumes warrant providing clear bicycle facilities to protect cyclists and warn motorists. Where dedicated lanes are not possible, shared-use markings should be installed. Extending facilities beyond the downtowns along Main Street and Walcott Street in Pawtucket and along Broad Street into Cumberland to the north would be an added benefit.

Improvements could also be considered on a parallel facility, such as Montgomery Street or High Street, although these streets do not offer as much connectivity as Broad Street.

Central Avenue / Cross Street

These streets provide a good connection between the station area and neighborhoods across the Blackstone River without significant interference from I-95 ramps and traffic.

Blackstone River Bikeway

The Blackstone River Bikeway is a 48-mile bike trail that will ultimately connect Worcester, MA and Providence, RI via the Blackstone River valley. Almost 10 miles have been completed, with an additional 3 miles under construction and 19 miles in design. The completed portion in Rhode Island stretches to Broad Street in Cumberland, making good bicycle facilities on Broad Street between the proposed commuter rail stop and Cumberland crucial to regional bicycle mobility. South of Cumberland, the interim route follows Roosevelt Avenue or Broad Street through Central Falls and Pawtucket. Connections to these facilities and to the final pathway, when constructed, will also be important.

Transit Access

Beyond the commuter rail stop connection central to the TOD district, connectivity to feeder transit services is also important. These services encourage development of the TOD as a hub, and provide a focal point where services can locate to take advantage of high daily pedestrian volumes. The following practices are recommended to maximize the advantages of feeder services on the development of the TOD community.

Interservice connectivity

Effective feeder service must connect the TOD to other areas where people want to go. Feeder service should be focused on remote locations that do not provide the same retail and commercial services as the TOD itself, so that travelers come to utilize not only the commuter rail service, but the businesses that aren't available to them at the remote location.

Transfers between different transit modes or routes frequently require travelers to change grade (e.g., from the depressed train platforms to an at-grade bus line). Each change of grade adds a disincentive to travelers, as it increases travel time and effort, and increases the potential to miss the connecting service. Connections points should be developed to minimize the number of grade changes. Where grade change is necessary, escalators and elevators should be installed along the most direct alignment to bus stops.

In addition, transit connections should always provide a safe and active environment, both actual and perceived. Placing commercial developments along the connection route provides travelers with services and offers an opportunity for businesses to serve highly trafficked areas, while allowing security personnel to maximize their focus on a particular area.

Interservice coordination

Scheduled transfers between modes should include sufficient time for travelers to connect without having to run. Peak period service should be frequent enough so that missing a connection does not require a long wait. Off-peak service should include timed transfers between multiple operators, to allow TOD developments to function as hubs.

Interservice information exchange

A critical part of modal connectivity is providing information that draws on all transit services, so riders do not need to know in advance or even care which service will take them where they want to go. Comprehensive information should be provided at the commuter rail platforms and at station-area bus stops so that riders perceive all transit as one linked system. This information should include schedules, maps, service bulletins, and real-time information about all routes accessed from the commuter rail stop area, as well as information about all routes that can be accessed in downtown Pawtucket, Providence, and Boston at a minimum. In this way, travelers can plan their trip at their origin, instead of making forced decisions mid-trip.

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Possible Transit Service Improvements

There are a number of possible adjustments that would improve interservice connectivity between existing RIPTA bus routes and the proposed Pawtucket/Central Falls commuter rail stop. The following section describes existing RIPTA bus routes in the vicinity of the proposed stop and identifies possible adjustments that would improve service to the site without significantly increasing transit operating costs.[3]

Current Services

RIPTA's Pawtucket downtown bus terminal, located one-half mile south of the proposed Pawtucket/Central Falls stop on Main Street and Roosevelt Avenue, is a major regional transfer point. The terminal is served by 12 RIPTA bus routes, including #71-Broad, which operates directly past the proposed commuter rail stop. Two additional RIPTA routes operate in close

[3] For purposes of this assessment, a significant cost increase is assumed if a potential service change requires either a commitment of one or more additional buses to maintain current service frequencies on a given route during peak hours, or if additional trips or route extensions greater than five minutes per one-way trip are needed.

proximity to the stop, including #72-Weeden/Central Falls and #75-Dexter/Lincoln Mall. Both operate on Dexter Street, passing through the Barton Street intersection approximately 0.2 mile west of Broad Street.

Route #71 operates predominantly north-south service along Broad Street between Ann Hope Way in Central Falls and downtown Pawtucket. Scheduled bus travel times between the Pawtucket Terminal and the train station site via Route #71 are four minutes on most northbound trips and three minutes on all southbound trips. The weekday timetable contains 30 trips running in each direction, serving the site at approximately 20-25 minute headways during peak periods and 40-45 minute headways during midday hours. The Saturday timetable includes 20 northbound and 18 southbound trips operating every 40 minutes, and the Sunday timetable includes 9 northbound and 8 southbound trips operating every 80 minutes. Route #71 trips are interlined through Pawtucket Terminal with Route #99-Providence, meaning that Route #71 passengers can continue directly to Kennedy Plaza in downtown Providence on Route #99 without changing buses. The resulting one-way onboard travel time between the former station site and downtown Providence is 26-28 minutes at peak times.

Route #72 operates north-south service primarily along Dexter Street to West Hunt Street, and continues generally west and south via Hunt Street, Lonsdale Avenue, Weeden Street, Power Road, Mineral Spring Avenue, and Smithfield Avenue toward downtown Providence. Buses serve the Barton Street intersection every 38-45 minutes during weekday peak hours, 75-80 minutes during midday hours, 60-65 minutes on Saturdays, and 85-95 minutes on Sundays in both directions. Northbound timetables contain 16 weekday, 13 Saturday, and 8 Sunday trips, while southbound timetables include 17 weekday, 13 Saturday, and 7 Sunday trips.

Route #75 operates north-south service primarily along Dexter Street and Lonsdale Avenue between downtown Pawtucket, Central Falls, and the Lincoln Mall. Buses serve the Barton Street intersection every 65-70 minutes in both directions. Northbound timetables contain 12 weekday, 11 Saturday, and 9 Sunday trips, while southbound timetables include 11 weekday, 10 Saturday, and 9 Sunday trips.

Improving Interservice Connectivity

Depending on the timing of commuter rail departures and arrivals at the proposed Pawtucket/Central Falls commuter rail stop, realignment of RIPTA Routes #72 and #75 could be considered as a means of enhancing transit connectivity between the Pawtucket Bus Terminal and the stop. Together with the #71, these routes could provide a relatively frequent shuttle connection to downtown Pawtucket for commuters using RIPTA bus service. This could be accomplished either by rerouting peak trips via the current #71 alignment, or by realigning the routes via Barton Street between Dexter Street and Broad Street. These options must be discussed in greater detail with

RIPTA before any preliminary recommendation can be made. Important variables that should be considered include:

- Commuter rail schedules proposed by MBTA
- The number of #72 and #75 passenger boardings and alightings occurring on Dexter south of Barton
- Impacts of additional running time, estimated at three to four minutes in each direction, on the #72 and #75 operating cycle times in the event that the route realignment option is selected

Tables 5-1 and 5-2 illustrate the cumulative morning and afternoon peak frequencies of RIPTA bus service operating between the Pawtucket Terminal and the train station site, assuming the existing schedules of Routes #71, #72 and #75. Cumulatively, the three routes operate 18 trips arriving at the intersection of Broad Street and Barton Street between 5:23 am and 8:43 am. The headway between these buses ranges from 1 to 24 minutes, and averages 15.6 minutes.

Similarly, the three routes collectively operate 20 southbound trips departing from Broad Street and Barton Street between 3:36 pm and 8:19 pm. The headway between these buses ranges from 1 to 32 minutes, and averages 14.2 minutes. Particularly during the PM peak, service frequency between the station and the Pawtucket Terminal would be significantly improved over Route #71 service operating alone.

Table 5-1: RIPTA Routes #71/72/75 Northbound Weekday AM Peak Bus Arrivals at Broad Street and Barton Street, Assuming #72 & #75 are Rerouted

Route #	Depart Kennedy Plaza	Depart Main & Roosevelt	Arrive Broad & Barton	Headway (Minutes)
72	--	5:20 am	5:23 am	--
99/71	5:29 am	5:48 am	5:51 am	24
72	--	6:00 am	6:03 am	12
99/71	5:41 am	6:00 am	6:03 am	0
75	--	6:20 am	6:23 am	20
99/71	6:03 am	6:22 am	6:25 am	2
72	--	6:38 am	6:41 am	16
99/71	6:25 am	6:44 am	6:47 am	6
99/71	6:47 am	7:06 am	7:10 am	23
72	--	7:15 am	7:18 am	8
75	--	7:30 am	7:33 am	15
99/71	7:09 am	7:31 am	7:35 am	2
99/71	7:31 am	7:53 am	7:57 am	22
72	--	7:55 am	7:58 am	1
99/71	7:42 am	8:04 am	8:08 am	10
99/71	8:00 am	8:22 am	8:26 am	18
72	--	8:34 am	8:37 am	11
75	--	8:40 am	8:43 am	6

Table 5-2: RIPTA Routes #71/72/75 Southbound Weekday PM Peak Bus Arrivals at Broad Street and Barton Street, Assuming #72 & #75 are Rerouted

Route #	Depart Broad & Barton	Arrive Main & Roosevelt	Arrive Kennedy Plaza	Headway (Minutes)
71/99	3:36 pm	3:40 pm	4:04 pm	--
72	3:50 pm	3:54 pm	--	14
71/99	3:58 pm	4:02 pm	4:26 pm	8
75	4:19 pm	4:23 pm	--	21
71/99	4:20 pm	4:24 pm	4:48 pm	1
72	4:33 pm	4:37 pm	--	13
71/99	4:42 pm	4:46 pm	5:10 pm	9
71/99	5:04 pm	5:08 pm	5:32 pm	12
72	5:10 pm	5:14 pm	--	6
75	5:29 pm	5:33 pm	--	19
71/99	5:30 pm	5:34 pm	5:58 pm	1
72	5:50 pm	5:54 pm	--	20
71/99	6:03 pm	6:06 pm	6:26 pm	13
72	6:28 pm	6:32 pm	--	25
75	6:34 pm	6:38 pm	--	6
71/99	6:38 pm	6:41 pm	7:01 pm	4
72	7:07 pm	7:11 pm	--	29
71/99	7:25 pm	7:28 pm	7:48 pm	18
72	7:47 pm	7:51 pm	--	22
71/99	8:19 pm	8:22 pm	8:42 pm	32

Policy Framework

Support for investments in the alternative transportation modes necessary to create a successful TOD needs to be backed up with government policies to help frame future discussions and analyses of parking and access. Financial policy statements that support a recognized mobility asset for the study area, such as the commuter rail platforms or bus bays at the former station site, can shape decision-making by illustrating the benefits of multi-modal investment options in comparison with the other investment options. TODs experience the most success when paired with progressive government policies specifically targeted toward TOD. For example, when San Diego, CA added a 16-mile light rail link, the Tijuana Trolley, in 1981, the service experienced

huge ridership, but no development whatsoever took place surrounding the stations. When the city proposed another extension, the Mission Valley Trolley, in 1982, it also enacted policies to foster a TOD environment, such as offering incentives for infill development near proposed trolley stops. By 1995, development surrounding the Mission Valley trolley was significant: 7,000 new housing units, 2,375 hotel rooms, 1.6 million square feet of retail, and 6 million square feet of office.[4]

[4] TCRP 102 Report 102: Transit Oriented Development in the United States. 2004. Page 168.

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Housing and Employment

A TOD becomes a place by containing a mix of residents, train riders, and shoppers. Therefore, the team examined the market feasibility for retail and housing near the former station site. Development at the train station will also have ripple effects on the larger communities of Pawtucket and Central Falls, spurring economic growth and new home construction. It will also facilitate access to businesses in the cities and increase the number of employment opportunities available to residents. An examination of current land uses and local demographics helps reveal what types of development the market can support.

Socioeconomic Characteristics

Current market conditions for housing, jobs, and overall economic growth will inform the type of development possible around the commuter rail stop. Research shows that TOD does not directly cause growth; it instead redistributes growth already poised to occur.[1]

The study area (a 10-minute walking radius of the former train station site) covers portions of nine Census Tracts and contains more than 40 percent of Pawtucket and Central Falls' combined population. Around one quarter of the population in the study area and in Pawtucket overall work in Pawtucket, with nearly 20% of Central Falls workers employed in Pawtucket. Over 95% of all Pawtucket and Central Falls workers are employed within Providence County (Table 6-1). This data suggests that a new commuter rail stop in Pawtucket/Central Falls would increase accessibility for local residents to the large employment base in Providence. It is also likely that the commuter rail will facilitate access to the larger job pool in downtown Boston for area residents.

[1] TCRP Report 102. Page 168.

Table 6-1: Population and Place of Work

	Study Area	Percent	Pawtucket	Percent	Central Falls	Percent
Population	37,659		72,958		18,928	
Workers	14,455		32,241		7,000	
Work in Pawtucket	3,370	23%	9,057	28%	1,230	18%
Work in Providence County	10,477	72%	22,700	70%	5,677	81%

Source: 2000 Census

A comparison of 1990 and 2000 U.S. Census data for Pawtucket and Central Falls is shown in Table 6-2. Both cities demonstrated limited growth, with Pawtucket, four times the size of Central Falls, adding just over 1,000 residents in the 15 years between 1990 and 2005. At the state level, population increased at 0.5 percent on an average annual basis, while both Central Falls and Pawtucket grew at just under half that rate, 0.2 percent on an average annual basis during the same time period.

Table 6-2: Population Trends in Pawtucket and Central Falls

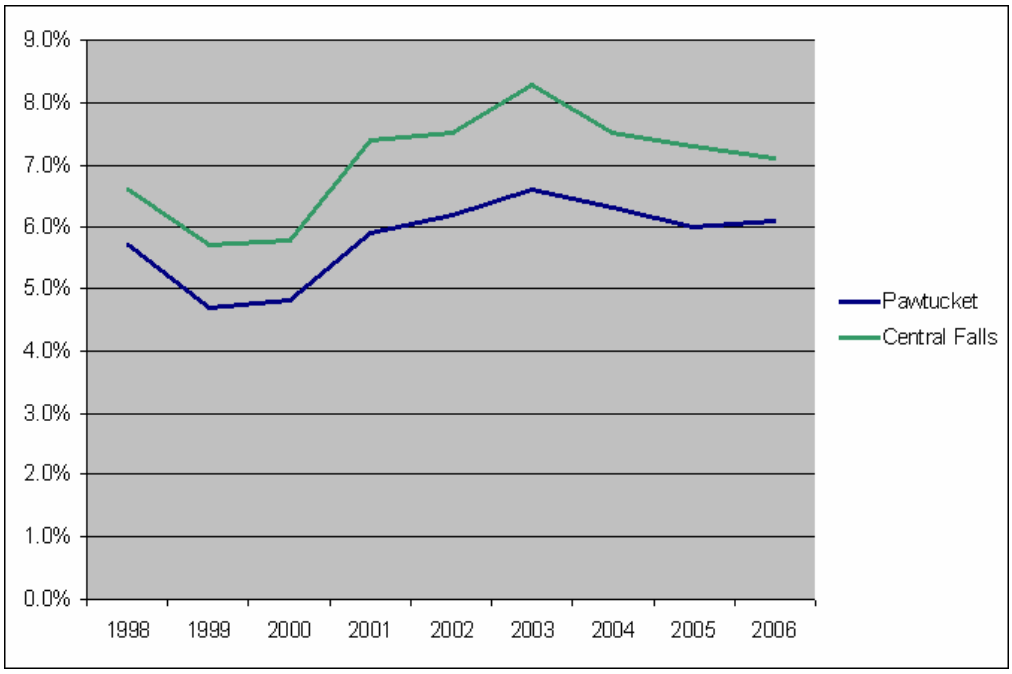
Area	1990	AAPC	2000	AAPC	2005
Central Falls	17,637	0.7%	18,928	0.2%	19,159
Pawtucket	72,644	0.0%	72,958	0.2%	73,742
Rhode Island	1,003,464	0.4%	1,048,319	0.5%	1,073,579

Source: U.S. Census Bureau
AAPC = Average Annual Percent Change

Unemployment levels in both Central Falls and Pawtucket have fluctuated over time due to the impact of the economic boom of late 1990's and the subsequent recession, with unemployment for both cities peaking in 2003 and then declining slightly, as shown in Figure 6-1.

While not directly comparable due to different data collection methodologies, the 2000 US Census data suggests that there are pockets of higher unemployment near the proposed station site, where approximately 12 percent of the residents were unemployed at that time, more than double the rate for each city.

Figure 6-1: Unemployment Rates in Pawtucket and Central Falls



Likewise, both cities currently have higher unemployment rates than the average for the state of Rhode Island, as shown in Table 6-3, for the period from 2004 through the first quarter of 2007.

Table 6-3: Recent Unemployment Trends

Area	2004	2005	2006	2007 Q1
Central Falls	7.5%	7.3%	7.1%	6.6%
Pawtucket	6.3%	6.0%	6.1%	5.7%
Rhode Island	5.1%	5.2%	5.1%	4.4%

Source: Bureau of Labor Statistics

A review was also conducted of average wage data at the state level for Rhode Island, Massachusetts and New England. As shown in Table 6-4, the rate of average wage growth has been very close for the three regions. However, average wages in Rhode Island are 26 percent less than average wages in Massachusetts and 21 percent less than average wages in New England.

Table 6-4: Average Wages

Area	1996	AAPC	2005
Rhode Island	$26,124	4.4%	$37,064
Massachusetts	$33,765	4.9%	$50,419
New England	$32,130	4.7%	$47,138

Source: Rhode Island Department of Labor and Training
AAPC = Average Annual Percent Change

Discretionary income in Central Falls and Pawtucket is limited, as the median household income for Pawtucket and Central Falls is significantly lower than median household income for the state of Rhode Island, as shown in Table 6-5. In Central Falls, median household income is 46 percent less than the median for the state, while Pawtucket is 25 percent less than the state.

Table 6-5: Median Household Income in 1999 dollars

Area	2000
Central Falls	$22,628
Pawtucket	$31,775
Rhode Island	$42,090

Source: US Census Bureau

This data suggests that Pawtucket and Central Falls would benefit greatly from TOD development and increased transit access to job markets in Boston, Providence, and T.F. Green Airport.

Land Uses

Existing land uses in the study area are very well mixed and ideal for supporting a largely captive market of transit users that would support TOD. This lends great support to the community's objective of keeping the existing neighborhood fabric together without seeing the adverse safety and traffic impacts of a commuter rail stop placed within a single-use employment or residential center.

Existing establishments draw mainly on local customers. Examples include an American Video rental outlet, a Walgreen's pharmacy, Market Union Fruit, and a branch of Family Dollar Stores. One block south is a branch of a fast food chain and within a half mile are several more restaurants, coffee shops, and pubs. Blackstone Valley Community Health Care has several offices within half a mile including administration and dental services. Memorial Hospital of Rhode Island is also approximately ¾ of a mile away.

An existing land use map for the greater region is depicted in Figure 6-2. A more detailed assessment of existing uses was conducted through a windshield survey of the local streets in the immediate study area. The results of that survey, in Table 6-6, clearly demonstrate a wide variety of residential, retail, office, and institutional uses within a 10-minute walk of the proposed commuter rail platforms. This mix is very supportive of TOD.

Figure 6-2: Pawtucket/Central Falls Land Use

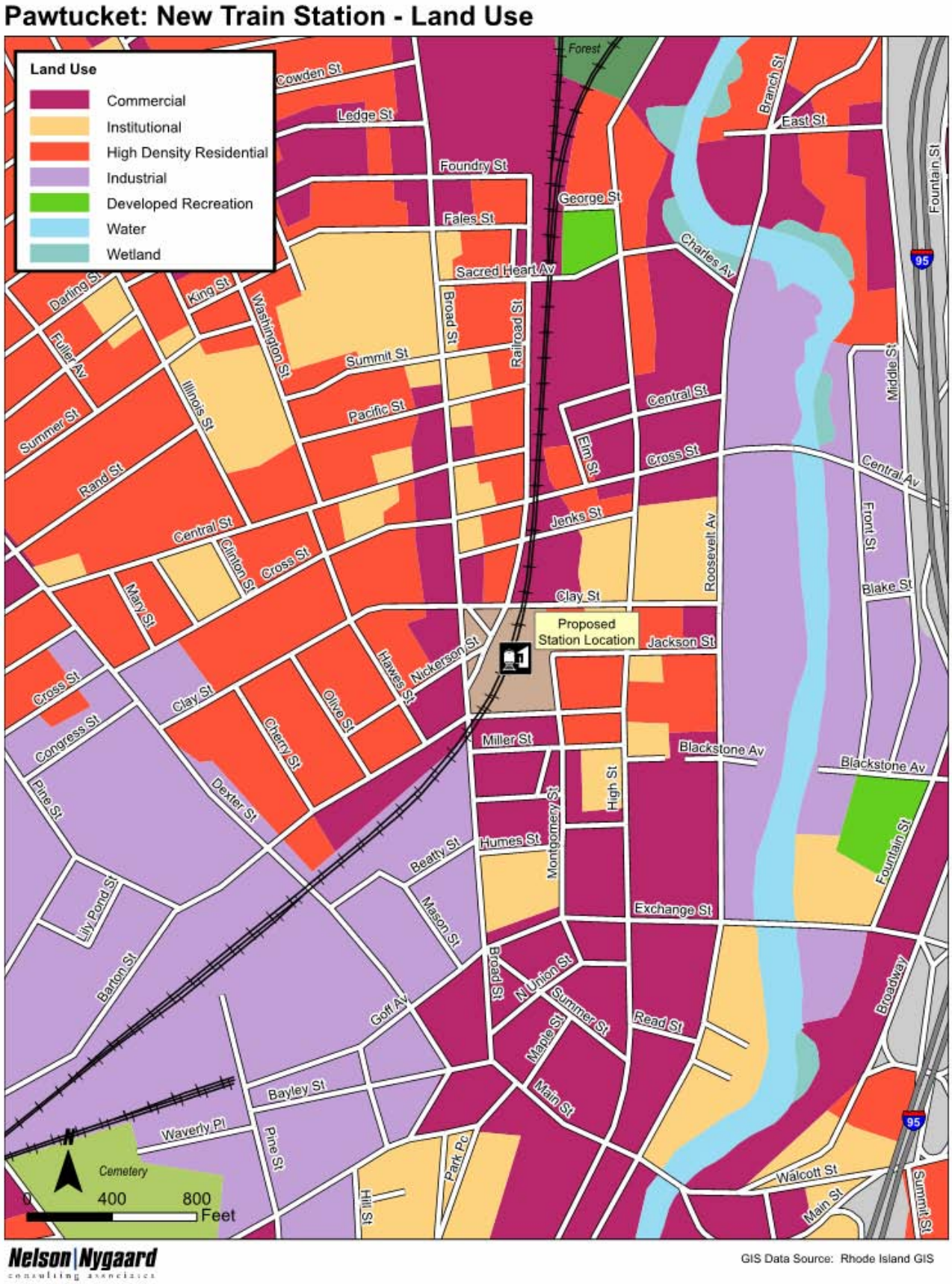


Table 6-6: Land Uses in Study Area

Street	Land Use: Residential	Office	Retail*	Institutional	Industrial	Parking Lot
Broad (north - south)						
Cowden - Charles/Sacred Heart		Y: insurance	Y: R, S			
Charles/Sacred Heart - Summit			Y	Y: church		
Summit - Clay			Y			
Clay - Barton			Y			
Barton - Grant			Y			
Grant - Humes			Y			
Humes - Exchange			Y			
Exchange - Main	Y		Y			
High Street (north - south)						
Charles - Cross	Y		Y			Y
Cross - Clay						
Clay - Jackson	Y		Y:Funeral Home	Y: Church		Y
Jackson - Miller mid-block	Y					
Miller mid-block - Exchange	Y					
Exchange - Main		Y	Y	Y: Public Library		Y
Main - East	Y	Y	Y			
Railroad St (north - south)						
Foundry (deadend) - Central (deadend)	Y				Y: next to train tracks	
Dexter (north - south)						
Garfield - Cross			Y			
Cross - Goff (Exhange)			Y			
Goff - Church			Y			
Roosevelt Ave (north - south)						
Charles - 1/2 to Central			Y		Y	Y
1/2 to Central - Jackson			Y		Y	
Jackson - Exchange	Y	Y				Y
Exchange - Main				Y: Police Station,		Y
Exchange St (east-west)						
Roosevelt - High	Y: Housing High Rise	Y: Electric Company				Y
High - Montgomery			Y: R, S	Y: Religious	Y: gas station	
Montgomery - Broad			Y: R, S, vacancies	Y: Social security		Y
Broad - Dexter	Y: Slater house highrise, Cientenial Towers	Y: BVCAP non-profit	Y: walgreens			Y
Main St (west - east)						
Dexter - Broad	Y: highrise			Y:School Dept		
Broad - Maple		Y	Y	Y:School Dept		
Maple - High		Y	Y			
High - Roosevelt		Y	Y	Y:Visitor Center		
Clay St (west - east)						
Dexter -Broad	Y					
Broad - High	Y		Y: R at Broad			Y at Broad
High - Roosevelt	Y					
Jackson St (west - east)						
Railroad tracks - Roosevelt	Y					
Central St (west - east)						
Dexter - Railroad st (deadend)	Y				Y: Gas station at Broad	
Railroad tracks - High	Y					Y
High - Roosevelt			Y	Y: perfomance theater	Y	
Foundry St (west - east)						
Fletcher - Railroad St (deadend)	Y				Y	
Fales St (west - east)						
Broad - Railroad St (deadend)	Y				Y	
Eastwood St (north - south)						
Fales St - Sacred Heart	Y				Y	
Cross St (west - east)						
Dexter - Broad	Y					
Broad - High	Y		Y			Y
High - Roosevelt			Y			Y
Charles St (west - east)						
Broad - railroad overpass	Y					
railroad overpass - Roosevelt	Y		Y			Y

*R=Restaurants, S=Shops

Average commercial vacancy rates in the neighborhood of the proposed station are in the same range as vacancy rates for Central Falls, and less than the current rate in Pawtucket, as shown in Table 6-7. The commercial rent per square foot in all three locations are similar, in the $10 to $12 range, however these rates are lower than rents charged elsewhere in northern Rhode Island.

Table 6-7: Commercial Real Estate Indicators

Area	Vacancy Rates	Commercial rents per Square Foot
Neighborhood of Proposed Station	5% to 7%	$10 to $12
Central Falls	6%	$10 to $12
Pawtucket	10%	$10 to $12
Northern Rhode Island	5%	$15

Sources: Bureau of Labor Statistics: CPS Household Survey, Hayes & Sherry, CB Richard Ellis.

Housing

One core purpose of TOD is providing housing near transit to get people to work efficiently without the use of a car. This actually saves households money, since the cost to ride transit is a great deal less than the cost to own a car. The Center for Transit Oriented Development conducted research on the subject of housing and transportation affordability, creating a "Housing Affordability Index" that takes into account both housing and transportation costs.[2] The center found through subsequent data collection that an average family spends 19 percent of the household budget on transportation, but for households with good access to transit, this number drops to 9 percent.[3] Transit access is especially important for lower income families, who spend proportionally more of their money on transportation than higher income people. The average high-income family spends 9 percent of its budget on transportation, while the average low-income family spends over half its budget – 55 percent – to pay for transportation. Therefore, focusing new housing development near the station and on the station site will provide homes with low transportation costs.

Research shows that successful TODs raise land values and, in turn, raise rents. For example, near Mockingbird station in Dallas, retail space rents for $40 per square foot, a number 40 percent above market rate. Residential rents stood at $1.60 per square foot in 2003, while properties not within walking

[2] For the complete report, see "The Affordability Index: A New Tool for Measuring the True Affordability of a Housing Choice." Brookings Institute. January 2006.
[3] Zimmerman, Maria. "Preserving Affordability." Center for Transit Oriented Development. www.reconnectingamerica.org, viewed 4/23/07.

distance of the station rented 20 percent lower.[4] The rising land values are not necessarily a detriment to affordability, because they allow developers to include affordable housing units in TODs by generating high rents from market rate units to offset the affordable unit subsidies. However, it is essential that public policies require affordable housing to be constructed, as the free market would not typically do so on its own.

The nonprofit Good Jobs First, which advocates for smart growth and economic development for working families, produced a profile of 25 TODs that specifically focused efforts on provision of affordable housing and access between jobs and housing. One example of a pioneering affordable housing project occurred at the Ohlone-Chynoweth station in San Jose. Prices for single family homes in San Jose were very high, at more than $500,000 in 2002. The station provided excellent transit service, with access to the Guadalupe corridor light rail (operated by the Santa Clara Valley Transportation Authority - VTA) and the Caltrain heavy rail connecting to San Francisco. The TOD at Ohlone-Chynoweth occurred against the backdrop of San Jose's housing initiative, begun in 1989, which focused on higher-density housing in the Guadalupe corridor. The development site, half owned by VTA and half owned by a private company, was an underutilized station parking lot. On the privately owned portion, Bridge Housing Corporation built 10.6 acres of medium and high density housing called Ohlone Court, which contained 135 very low income units and was completed in 1997.[5]

The other portion of the site was leased to Eden Housing and consisted of 7.3 acres of housing, a small amount of retail, and 4.3 acres for 200 parking spaces and bus bays. Ohlone-Chynoweth Commons contained 194 very low and low income units, partially submerged parking, 4,400 square feet of retail and a 4,000 square foot community center. The housing was targeted toward people earning 30 to 60 percent of the median income. An important aspect of the development was the community center, which contained child care, after school programs, literacy training, tax assistance, and computer labs. Ohlone-Chynoweth Commons cost $31 million, with funds received from a variety of sources such as the City of San Jose, the Metropolitan Transportation Commission (the Bay Area's MPO), Fannie Mae, and the Federal Home Loan Bank. The state, federal, and city governments awarded substantial tax exemptions, and Eden Housing also took out loans with the city and Wells Fargo. These housing developments increased transit ridership and also spurred new development. Upscale, luxury apartments called Pear Place were built in 2003 just south of Ohlone-Chynoweth Commons.[6]

[4] TCRP 102. Page 161, 164.
[5] Dittmar, Hank and Gloria Ohland. The New Transit Town. Island Press: Washington, 2004. Page 193.
[6] Grady, Sarah and Greg LeRoy. Making the Connection: Transit Oriented Development and Jobs. Good Jobs First, 2006. Page 51.

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Current Housing Characteristics

Most residents of the densely populated neighborhood around the former station site live in multi-family housing, including a multistory apartment tower one block south of the proposed station site and many 3-4 unit buildings. Over 95 percent of the neighborhood's housing was built before 1990. The types of housing available in the neighborhood around the former station site are shown in Table 6-8.

Table 6-8: Neighborhood Housing in 2000

Building size	Number of households	Percentage of households
1-unit, detached	194	5.3%
1-unit, attached	16	0.4%
2 units	396	10.8%
3 or 4 units	1,007	27.3%
5 to 9 units	509	13.8%
10 to 19 units	168	4.6%
20 or more units	1,392	37.8%
Total	3,682	100.0%

Source: U.S. Census Bureau

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Neighborhood Features

The neighborhood is divided between the Central Falls School District and Pawtucket School District, with the closest school located one block northwest of the proposed station site. There are three parks each several blocks away from the site: Jenks, Slater, and Wilkinson. Slater Park includes the Slater Mill Historic Site museum. In addition, 18 churches are within half a mile of the project site, including New City Church, located one block south, and Holy Cross, located one block east.

Employment

TOD's economic development benefits should help lift up all income levels, and should not simply provide a wealthy enclave of luxury condominiums and high-end retail. Many people recently have chosen the lifestyle embraced by TOD because they wish to avoid driving and prefer to live in a

community environment; for others, TOD offers a way of drastically reducing household costs.

One way to ensure that job creation and retention make up part of a TOD is through Community Benefit Agreements between a community leader and the developer. Ballpark Village in San Diego, to be completed by 2012, consists of a 3.2 million square feet mixed use village centered on a trolley and bus hub, and will include 1,600 residential units, 136 affordable units, office space, and retail shops. The developer, JMI Realty, entered into a CBA with A Coalition Organized for Responsible Development (ACCORD) under the belief that without the CBA, ACCORD would try and block the project at the San Diego City Council. JMI included many provisions geared toward employment at the TOD, including:

- Employers must pay a living wage.
- The developer hired a unionized chain for the TOD's grocery store.
- Emphasis was placed on local hire and on hiring recently-rehabilitated locals.
- The developer provided a job placement center on-site.
- The developer provided $1.45 million for an off-site job training program.
- To evaluate the ripple effects of TOD on other areas, the developer undertook a $100,000 economic development study.[7]

In Columbus, OH, an urban-infill TOD project focused on providing access to jobs through transit. Linden, a depressed neighborhood in northern Columbus, is an Empowerment Zone with 10 percent unemployment and 25 percent of residents without access to a car. In 1997, the nonprofit Building Responsibility, Equality, and Dignity (BREAD) convinced the Central Ohio Transit Authority (COTA) and the Mayor to provide better jobs and housing through transit connections. At the time, COTA was applying for a federal Livable Cities grant to build a transit center in the suburbs. BREAD convinced COTA to amend its grant application and attain funds for a sister transit center in the city. COTA received $2.1 million from Livable Cities for the Linden Transit Center, as well as $270,000 from the Ohio DOT. The transit center, completed in 1999, connects eight bus lines and includes a bank, daycare, and children's clinic. The center has become a community meeting place and is heavily utilized. Two more transit centers have opened since that time. COTA and BREAD used the grants to plan bus routes specifically based on worker needs, and even hired a Jobs Access Coordinator. COTA implemented many jobs access programs, including subsidized service through major employers directly to job sites and better connections between suburban and inner city routes, although funding cuts have forced the agency to reduce many initiatives.[8]

[7] Making the Connection. Page 10.
[8] Making the Connection 38.

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Existing Business Development Policies

Both Pawtucket and Central Falls offer a series of public business incentives to attract business, as summarized in Table 6-9. These incentives for small businesses could be utilized to attract retail and commercial businesses to the proposed station site.

Table 6-9: Public Business Incentives

City	Commercial or Industry Property Tax Benefits	Other Programs and Incentives
Central Falls		• Entire city is a state-designated Enterprise Zone • Job Creation Incentive program • Business loan programs available
Pawtucket	The city offers a financial incentive for new and existing businesses to construct and/or substantially renovate industrial and commercial facilities. New or additional municipal property tax assessments are phased-in according to a schedule that is directly related to the creation of new or expanded employment opportunities for Pawtucket residents.	• Portion of city [although not including the project site] is a state-designated Enterprise Zone • Local business loan programs available • Arts and Entertainment District incentives (described below)

Source: Rhode Island Economic Development Corporation

Pawtucket also offers incentives designed to foster the growth of the city's Arts and Entertainment District. This district was established by the Rhode Island General Assembly in 1998 and exempts the sale of artworks in the district from the state sales tax. It also allows artists living and working in the district to be exempt from the state income tax on income generated by their creative work, and has offered grants to artists or organizations whose work benefits the city and its residents.

Possible Housing and Employment Policies

A review of best practices at TODs across North America reveals some policy suggestions that could be adopted by the Cities of Pawtucket and Central Falls in cooperation with the State, local housing developers, and neighborhood groups.

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Changes to Zoning

Inclusionary Zoning

In order to ensure and preserve affordability of housing around a TOD, requirements and incentives for housing developers are necessary. Typical inclusionary zoning provisions require a certain percentage of new development over a certain size to be available to households below the median income in the area. Some communities grant additional bulk or height to the developer in return for meeting the inclusionary requirement. Regardless of the details, developers in a TOD will attempt to maximize profits by selling or renting all units at a market rate without an inclusionary requirement. Fortunately, land values typically increase in a TOD, enabling developers to recover the cost of building below-market-rate housing.

Increased Density

In order to create a successful walking environment with a mix of uses in a TOD, greater density is necessary. Many communities are fearful of the size and impacts of greater density. However, greater density is typically only allowed in close proximity to a transit station. Policies that allow developers to build additional units near a transit station will enable the necessary critical mass of residents and retail shops to sustain TOD.

Reduced Parking Minimums

One of the most expensive parts of any development project is parking, whether that is in the form of costly garage structures or paved surfaces that cannot be developed for other purposes. To encourage the necessary density and affordability, parking requirements are often reduced in a TOD. This is easy to support operationally, as mixed-use typically draws users who share their parking, requiring less overall. In addition, the convenience of transit reduces auto ownership among residents. Many employees and customers travel to the TOD by means other than a car, further supporting the reduced parking minimums and allowing increased density and affordability.

■

Special Districts

Overlay Districts

Communities often employ special powers of government through the use of an overlay district or redevelopment area designation. When established, a TOD-supportive district can allow more changes to traditional zoning to occur in order to achieve the necessary level of development and infrastructure. Generally, a neighborhood board or elected body oversees the decisions made in an overlay district or redevelopment area.

Parking Benefit Districts

Where financing for TOD-related infrastructure improvements is difficult to obtain, parking benefit districts have been used successfully in many North American cities to generate the necessary revenue. By charging nominal fees for on- and off-street parking consistently across a downtown area, many communities have generated revenue while controlling parking problems, such as poor turnover, meter-feeding, and excessive vehicle trips. Pricing controls force motorists to treat parking as a commodity, not as a freedom. All revenues created in a parking benefit district are turned directly back into the district to pay for amenities like sidewalk improvements, street trees, and trash collection.

■

Financing Programs

Location Efficient Mortgages

In areas where development is slow to occur due to lower incomes and property values, a new TOD can be the necessary catalyst for jobs and increased property value. However, many existing residents may be no more capable of buying property than they were before the TOD was constructed. Location Efficient Mortgages (LEMs) have proven successful in several North American cities. Recipients are subject to easier qualification criteria and get lower rates on account of their properties being located in a TOD, where personal transportation costs are significantly lower than areas dependent on automobile transportation only. More and more lenders are working to develop these programs in reaction to the growth of housing near transit stations in the United States.

Façade Enhancement Loans

Many communities offer low interest loans and free design services for façade improvements to local businesses, especially in business districts near transit stations. These programs enable TODs to develop attractive pedestrian environments that encourage walking and shopping, while helping existing businesses look new.

■

Marketing Programs

In order to stimulate interest in new TODs and attract visitors, residents, and businesses, many communities invest in marketing tools that advertise the special amenities of the TOD. Pawtucket already has an active arts marketing campaign and the Pawtucket Red Sox. These marketing campaigns can be utilized to attract activity to the proposed TOD district. Communities can easily take advantage of public infrastructure that provides free marketing space for community programs associated with a TOD. By

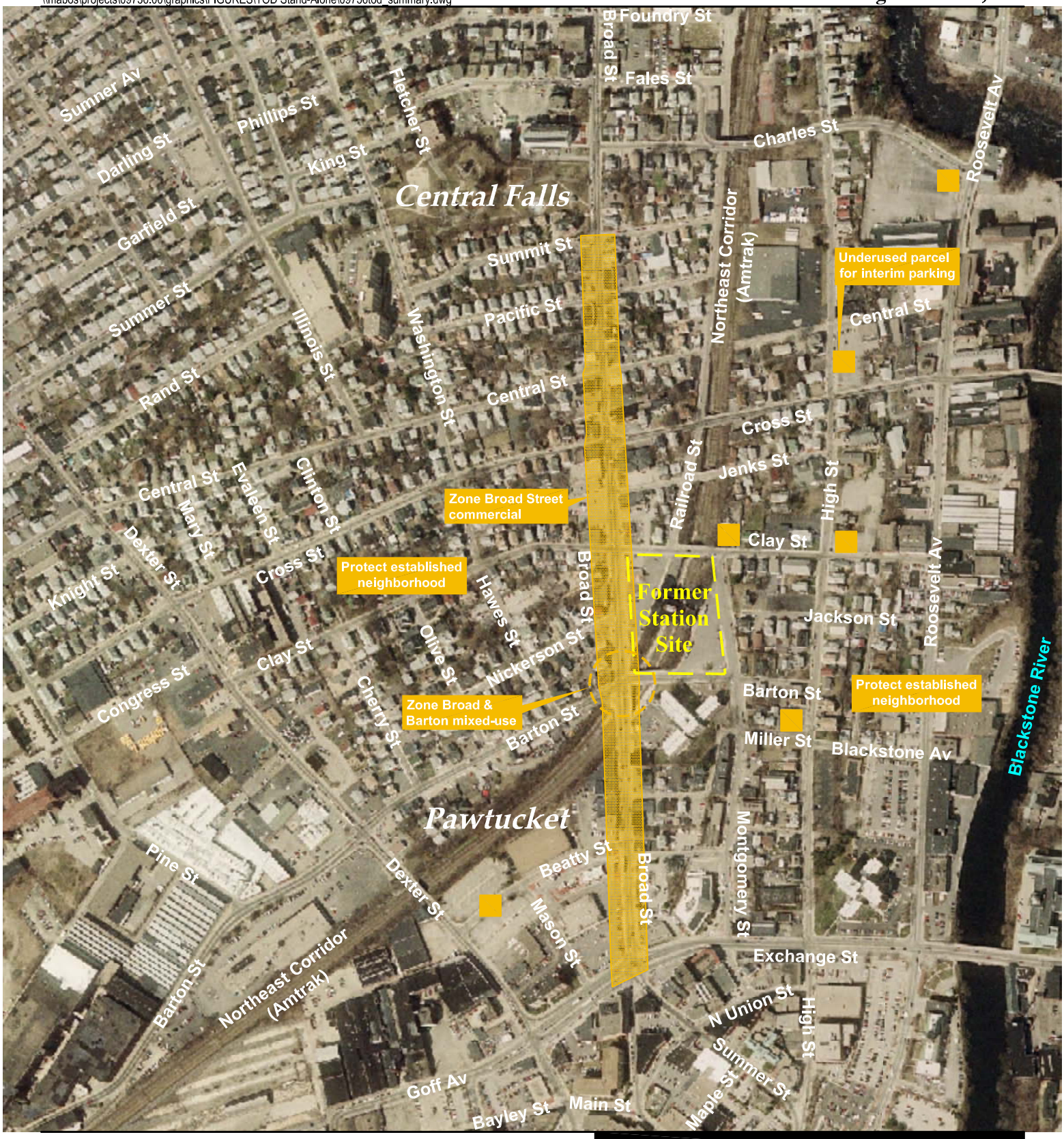
creating a sense of excitement or importance, new and existing members of the community seek to explore the TOD area amenities, stimulating the necessary activity for job creation.

Recommended Housing and Economic Development Actions

In addition to general policies for encouraging TOD, as previously described, it is important to formulate a plan for the specific community surrounding a transit stop. To that effect, the following recommendations were developed for the area around the former station site:

- Zone Broad Street as a commercial corridor, connecting downtown Pawtucket, the commuter rail stop, and Central Falls.
- Protect existing residential neighborhoods through zoning or tax incentives.
- Zone the area around the corner of Broad Street and Barton Street for mixed-use development.
- Consider unused or underutilized parcels for parking as an interim use.

The location of these suggested improvements is shown in Figure 6-3.



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Pawtucket/Central Falls Commuter Rail Facility
Feasibility Study and Site Analysis

Figure 6-3

Housing and Economic Development Actions

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7

Conclusion

The Pawtucket/Central Falls Commuter Rail Facility Transit-Oriented Development Analysis was performed to accomplish several goals, all with the aim of helping determine the potential impacts and benefits to the communities around the preferred commuter rail stop site. Key aspects of the TOD analysis included:

- Education and Public Outreach: Through a series of interviews with community representatives and two public workshops, the team explained the principles of TOD, and learned about community needs, concerns, and visions.
- Parking and Traffic: By analyzing existing parking and traffic, and then predicting the impact of a commuter rail stop, the team developed recommended traffic improvements to address resident concerns and maintain quality of life in the community.
- Multimodal Networks: The team examined pedestrian accommodations, bicycle networks, and transit access around the former station site, and produced suggestions for improving these facilities.
- Housing and Employment: By means of analyzing existing socioeconomic data and economic development policies, the team determined a recommended policy framework for guiding TOD around the commuter rail stop so that it will blend with and serve the existing community.

Summary of Recommendations

The following section summarizes the suggested actions and policies for encouraging successful TOD near the proposed Pawtucket/Central Falls commuter rail stop. The location of the recommended improvements and changes is shown in Figure 7-1.

■

Parking and Traffic

Improvements are recommended at the following locations:

- Broad Street, Goff Avenue, and Exchange Street: A second lane on the Broad Street southbound approach would improve level of service at this intersection. Traffic improvements should be designed so as not to make the pedestrian crossing more difficult. Right-of-way acquisition may be required to implement this change.
- Broad Street and Clay Street: This intersection should be signalized to prevent failing level of service on Clay Street.
- Broad Street Corridor: Signals along the Broad Street corridor between Barton Street and Cross Street should be interconnected and coordinated.

■

Pedestrians

Improvements are recommended at the following locations:

- Broad Street Corridor: Broad Street is a major corridor between downtown Pawtucket, the former station site, and Central Falls. Pedestrian amenities should be improved by adding zebra-stripe crosswalks, pedestrian-scale lighting, Americans with Disabilities Act (ADA) detectable warning panels at wheelchair ramps, and LED countdown lights at crosswalks. Trees, benches, and trash cans would also improve the streetscape.
- Broad Street, Goff Avenue, and Exchange Street: This intersection is wide and difficult for pedestrians to cross. Improvements might include median refuges to allow pedestrians to cross the street in two stages, tightened corner radii to slow down right-turning vehicles, and putting the pedestrian phase on recall so that pedestrians get a crossing signal every light cycle. Pedestrian improvements should be coordinated with traffic improvements previously discussed.
- Broad Street Bridge: Parking should be allowed on the bridge to help separate pedestrians from traffic. Lighting should also be improved.
- Barton Street and Clay Street east of Broad Street: These streets provide good pedestrian access between Broad Street and the neighborhood to the east. They should be improved with trees, lighting, and wider sidewalks, where possible.
- Montgomery Street: This street is a good connection between the former station site and downtown Pawtucket, and has lower traffic volume than Broad Street. Neighborhood residents have expressed concern about

safety on Montgomery Street. The street should be improved with better lighting and signage to guide pedestrians to the downtown.

- Wayfinding: A clear, consistent wayfinding system should be implemented to help pedestrians navigate between the proposed commuter rail stop, downtown Pawtucket, and other destinations.

■

Bicycle

Improvements are recommended at the following locations:

- Broad Street Corridor: Dedicated bicycle lanes should be provided where possible, with shared-use markings provided elsewhere.
- Cross Street and Central Avenue: This corridor offers a good link from the proposed station to neighborhoods on the east side of the Blackstone River, without interference from I-95 or its ramps. This corridor should be improved with dedicated bicycle lanes or shared-use markings, as appropriate.
- Blackstone River Bikeway: Connections to the existing and proposed Blackstone River Bikeway should be emphasized, including the Broad Street corridor.
- Wayfinding: A clear, consistent wayfinding system should be implemented to help cyclists connect between the proposed commuter rail stop, downtown Pawtucket, the Broad Street Corridor, the Cross Street/Central Avenue corridor, and the Blackstone River Bikeway.

■

Transit Access

Improvements are recommended to the following services:

- Routes 72 and 75: The cities should engage in discussions with RIPTA to determine options for rerouting Bus Routes 72 and 75 to serve the proposed commuter rail facility.

■

Housing and Employment

Improvements and changes are recommended at the following locations:

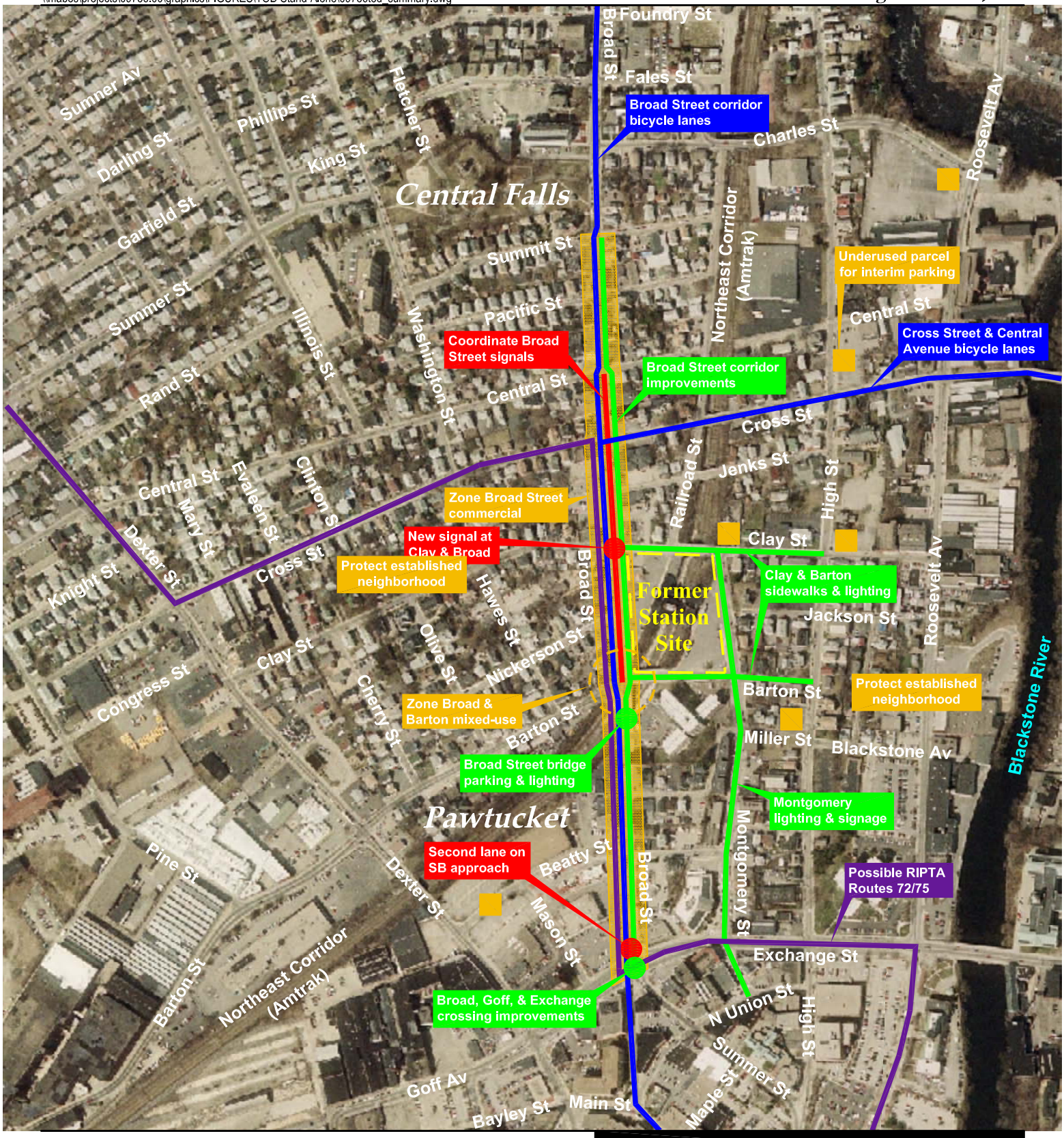
- Broad Street Corridor: Zone Broad Street as a commercial corridor, connecting downtown Pawtucket, the commuter rail stop, and Central Falls.
- Existing Residential Neighborhoods: Protect established neighborhoods through zoning or tax incentives.

- Broad Street and Barton Street: Zone this vicinity for mixed-use development.
- Unused or underutilized parcels: Consider parking as an interim use.

Next Steps

The commuter rail stop project will next enter the NEPA environmental permitting process[1]. During permitting and design, it is important that communication channels between the cities, the state, and the community remain open, to ensure that the project is consistent with the neighborhood's vision. After construction of the commuter rail stop, the cities should work to promote TOD around the stop that is consistent with community concerns and needs, again working with the community, to make viable, beneficial TOD projects a reality.

[1] See Pawtucket/Central Falls Commuter Rail Facility Feasibility Study and Site Analysis Chapter 12 for detailed description of the project next steps for the overall commuter rail stop project.



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- Traffic Improvement or Action
- Pedestrian Improvement or Action
- Bicycle Improvement or Action
- Transit Improvement or Action
- Housing or Economic Action

Pawtucket/Central Falls Commuter Rail Facility
Feasibility Study and Site Analysis

Figure 7-1

Recommended Improvements and Changes

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A

Appendix A: Meeting Minutes

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Transportation
Land Development
Environmental
Services

Vanasse Hangen Brustlin, Inc.

99 High Street, 10th Floor
Boston, Massachusetts 02110
617 728-7777
FAX 617 728-7782

Meeting Notes

Attendees: See Attached Sign-In Sheet

Date/Time: May 10, 2007; 6:00 PM

Project No.: 09736.00

Place: Central Falls YWCA
43 Hawes Street
Central Falls, RI 02863

Re: Pawtucket/Central Falls Commuter Rail Facility Feasibility Study and Site Analysis
TOD Charrette #1

Notes taken by: Nelson/Nygaard

The purpose of the first TOD charrette was to inform the community of the project status, present a broad overview of transit oriented development, and to give the community an opportunity to speak about neighborhood issues and concerns and visions regarding the station site area. The charrette consisted of a project update, a presentation on TOD, and two community break-out sessions - one for current neighborhood issues and concerns followed by a second session regarding the future of the neighborhood.

Project Update

Mike Cassidy, Director of Planning and Redevelopment for the City of Pawtucket, gave a brief presentation concerning project status, including an update on the status of the proposed CVS/pharmacy store.

TOD Overview

Jason Schreiber, Nelson Nygaard Associates, presented an overview of transit oriented development. The presentation included some basic TOD definitions as well as examples both of good and bad TOD initiatives.

Break-Out Session #1

The purpose of the first break-out session was to elicit community concerns about the existing area around the station. Small groups gathered around an aerial photo of the study area and wrote their ideas on the map. After about 20 minutes, the large group reconvened and a representative from each small group reported on that group's discussions.

The community identified the following likes and dislikes during the first break-out session:

Likes

Transportation & Access

- Feel safe walking
- Central location
- On bus line

Neighborhood Resources

- Drugstore on corner/local services
- Mom and pop stores
- Barton Street improved with new housing
- Neighborhood crime watch
- Cleanups/block parties
- Rents are affordable?
- PCDC--$14 million into the community (earth day, block party, got rid of prostitutes)
- Homey environment

Dislikes

Transportation

- Traffic after work
- On-street parking for tenants
- High-speed traffic is dangerous
- Snow??
- Too much traffic between 2 and 6 p.m. on Broad and Dexter, also at Barton
- Unsafe streets for kids to walk unsupervised and elderly to walk too
- Congestion—station is in the heart of the neighborhood
- Traffic congestion will increase
- Pedestrian safety from cars

Safety

- Montgomery Street feels unsafe
- Dark empty around depot
- People who hang around Walgreens
- Getting honked at
- Prostitutes/johns
- Violence
- 204 Broad Street—fence it in?
- Prostitutes want train riders for higher clientele
- Poor lighting everywhere—on Broad St. & around the station

Economic Development

- Not enough jobs today or from station
- Station isn't economically feasible
- Fear of landlords buying up properties and gentrifying the area
- Fear of taxes going up
- PCDC efforts will be for nothing if train ruins all their progress
- Gentrification will push low-income and elderly residents out of their homes

Environment

- Noise from traffic and train
- Fear of losing neighborhood feel
- Fear of losing the unity of community to outsiders

Public Process

- So much $$ already gone into station, why not put it into community improvements that you are saying will happen as result of station?
- Want to see a medical facility—where are city priorities?
- Don't want outsiders, who don't live there but scream "Save the building!" Why should they have a say in what happens in our neighborhood?
- Process hasn't had residents' interest at heart, they are an afterthought
- Schools need $$, why not invest in them?
- Priority for Boston commuters, not us

Break-Out Session #2

The purpose of the second break-out session was to determine community vision for the neighborhood around the station area. Small groups again gathered around an aerial photo of the study area and wrote their ideas on the map. After about 20 minutes, the large group reconvened and a representative from each small group reported on that group's discussions.

The community envisioned the following as desirable for the future:

Housing Affordability

- Affordable housing
- A rent control-type program
- Different tax rates for multiple-property owners vs. single-property owners
- Tax stabilization
- Homestead protection
- Concern about gentrification

Economic Development

- More retail (small businesses)
- New jobs
- Protect existing small businesses
- No empty storefronts – retail mall
- Use the revenue from the TOD to fund community improvements

Driving Environment

- Potholes fixed
- Better design of traffic patterns
- No parking at train station (so it won't create new traffic)
- Prevent overflow commuters from South Attleboro park-and-ride

Pedestrian Environment

- Lighting
- Clear signage
- Regular street cleaning
- Better sidewalks to avoid tripping

Community Amenities

- Parks and other types of green space
- Public pool, playground
- Benches
- Place for teens to hang out, such a recreation center
- Make the area livelier, with tourist attractions about the history of Pawtucket (jewelry, etc.)
- Community programs for kids

Proposed Train Station Site

- Tear down the train station
- Preserve the train station building
- Use the proposed site as a train station
- Use Cumberland/Smithfield Ave. locations
- University Campus
- Education programs
- Arts programs
- Johnson and Wales program
- Medical facility
- Community center
- Do something with the vacant building at the proposed site
- Find creative solutions to fix it

Other

- Scholarship money for kids who take the train to URI
- Fast development schedule
- Don't attract outsiders
- No more crime
- More undercover cops
- Want private security
- Create a feeling of safety
- Get rid of prostitution in the area
- Keep the character of the neighborhood the same
- Preserve the residents' existing way of life
- Concern for fellow neighbors
- People come first
- Recognize that there are two issues: the historic train station building and the platform below
- Use City money to benefit residents, not commuters

Attachments:

- Sign-In Sheet

NN/md

xc: Attendees, File

p1

City of Pawtucket, Department of Planning and Redevelopment
The Pawtucket/Central Falls Commuter Rail Facility Feasibility Study and Site Analysis

Meeting Attendance Sheet – TOD Charette #1

Date: May 10, 2007	**Time:** 6:30 PM – 8:30 PM	**Location**: YWCA, 43 Hawes Street, Central Falls

Name	Representing	Address	Phone	E-mail
Janice Kelly	Kennedy	175 Broad ST Apt 224	722-4451	
DIANE FAGAN	KENNEDY'S	175 BROAD ST APT 315	CELL PHONE 226 5074	
JANICE WILK	"	" "	475-3941	
MICHAEL CARLONE	STOP & SHOP	130 Broad St.	305-5205	
Nancy White	DCDC	210 West Ave.	726-1173, EXT 114	nancywhite pawtucketcdc.com
Dan Gallivan	Pawt City Council	101 Vine Street Pawtucket, RI	726-0559	DGALLIVAN@verizon.net
Nancy Howard	LISC	229 Waterman St. Providence, RI	331-0131	NHoward@liscorg

p2

City of Pawtucket, Department of Planning and Redevelopment
The Pawtucket/Central Falls Commuter Rail Facility Feasibility Study and Site Analysis

Meeting Attendance Sheet – TOD Charette #1

Date: May 10, 2007	**Time:** 6:30 PM – 8:30 PM	**Location**: YWCA, 43 Hawes Street, Central Falls

Name	Representing	Address	Phone	E-mail
Ulardo Patino	City Council Ward 3 CF	7 Sterling St Central Falls RI	401-725-1502	Councilmanpatino @verizon.net
Ed Tetzner	Mayor Doyle	137 Roosevelt Ave	728-0500 x358	
Ron LaFlamme		159 Montgomery St	663-5175	
Rich Davis	Pawtucket Foundation		725-4400	
Colleen Daley Ndaye	PCDC	210 West Ave	726-1173	
Fred Ordonez	Progreso Latino	626 Broad St	728-5920	wordonez@progresolatino.org
Fernando Soula Arboleda		170 Barton St.	723-5292	—

City of Pawtucket, Department of Planning and Redevelopment
The Pawtucket/Central Falls Commuter Rail Facility Feasibility Study and Site Analysis

Meeting Attendance Sheet – TOD Charette #1

Date: May 10, 2007	**Time:** 6:30 PM – 8:30 PM	**Location**: YWCA, 43 Hawes Street, Central Falls

Name	Representing	Address	Phone	E-mail
NEIL LEVITT	DHK	155 MASSACHUSETTS AVE, BOSTON 02115		
James Marsden		16 Hunt St C Falls		
Leticia Delgado	RENEW/PCDC	210 West Ave.	LeticiaDelgado@Pawtucketcdc.com	
Sherri Pecard		107 Sacred Heart Ave.	401-722-4721	
Oscar Seelbinder	SMPO	5855 Ridgeway Center Pkwy Memphis TN 38120	901 327 7676	

City of Pawtucket, Department of Planning and Redevelopment
The Pawtucket/Central Falls Commuter Rail Facility Feasibility Study and Site Analysis

Meeting Attendance Sheet – TOD Charette #1

Date: May 10, 2007	**Time:** 6:30 PM – 8:30 PM	**Location**: YWCA, 43 Hawes Street, Central Falls

Name	Representing	Address	Phone	E-mail
Rep Kim Ducharme		2 Hawes St	401-723-0577	Pcmcss6772@aol.com

Transportation
Land Development
Environmental
Services

Vanasse Hangen Brustlin, Inc.

99 High Street, 10th Floor
Boston, Massachusetts 02110
617 728-7777
FAX 617 728-7782

Meeting Notes

Attendees: See Attached Sign-In Sheet

Date/Time: May 24, 2007; 6:00 PM

Project No.: 09736.00

Place: Central Falls YWCA
43 Hawes Street
Central Falls, RI 02863

Re: Pawtucket/Central Falls Commuter Rail Facility Feasibility Study and Site Analysis
TOD Charrette #2

Notes taken by: Nelson/Nygaard

The purpose of the second TOD charrette was to give the public an opportunity to expand on their concerns and obtain answers to questions in five areas related to the Pawtucket/Central Falls Commuter Rail Stop development: traffic and parking, economic development (jobs and housing), commuter rail stop, neighborhood update, and safety. The charrette format was an informal two-hour open house, during which the public could drop in at any time.

Ranking of Concerns

Upon entering, people were given dot stickers to place on a list of concerns identified in the first TOD charrette to rank the most pressing issues. Figure 1 shows how the community ranked concerns in terms of total number of dots; Figure 2 shows the priority rankings by percentage.

Figure 1

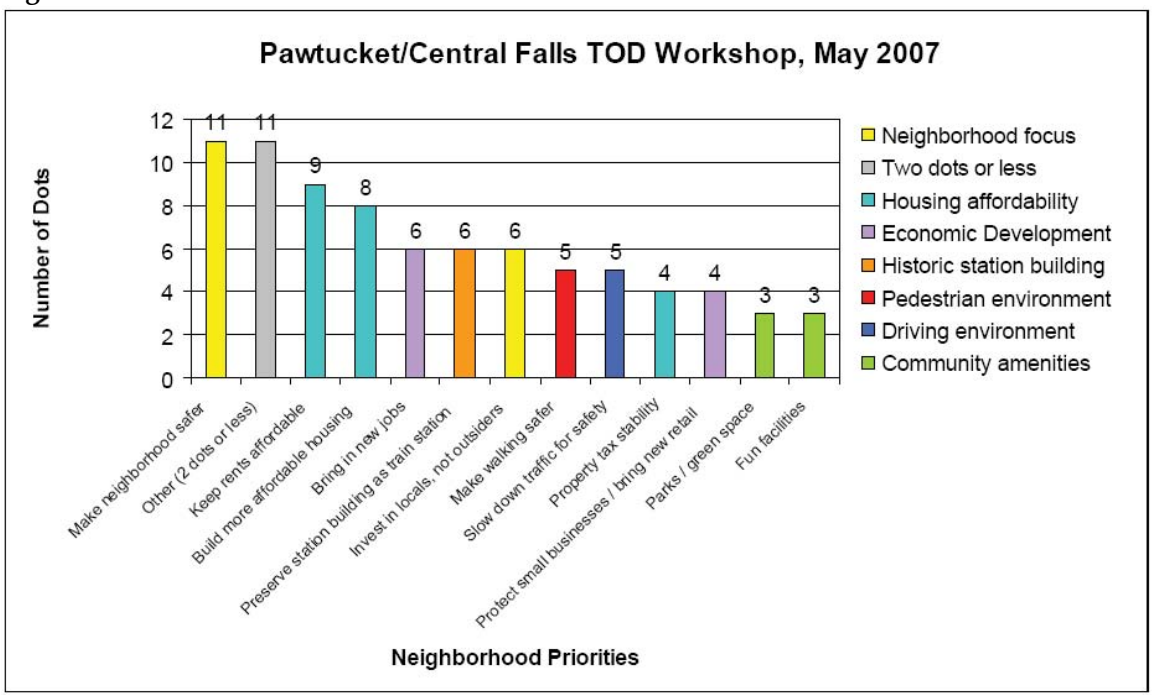
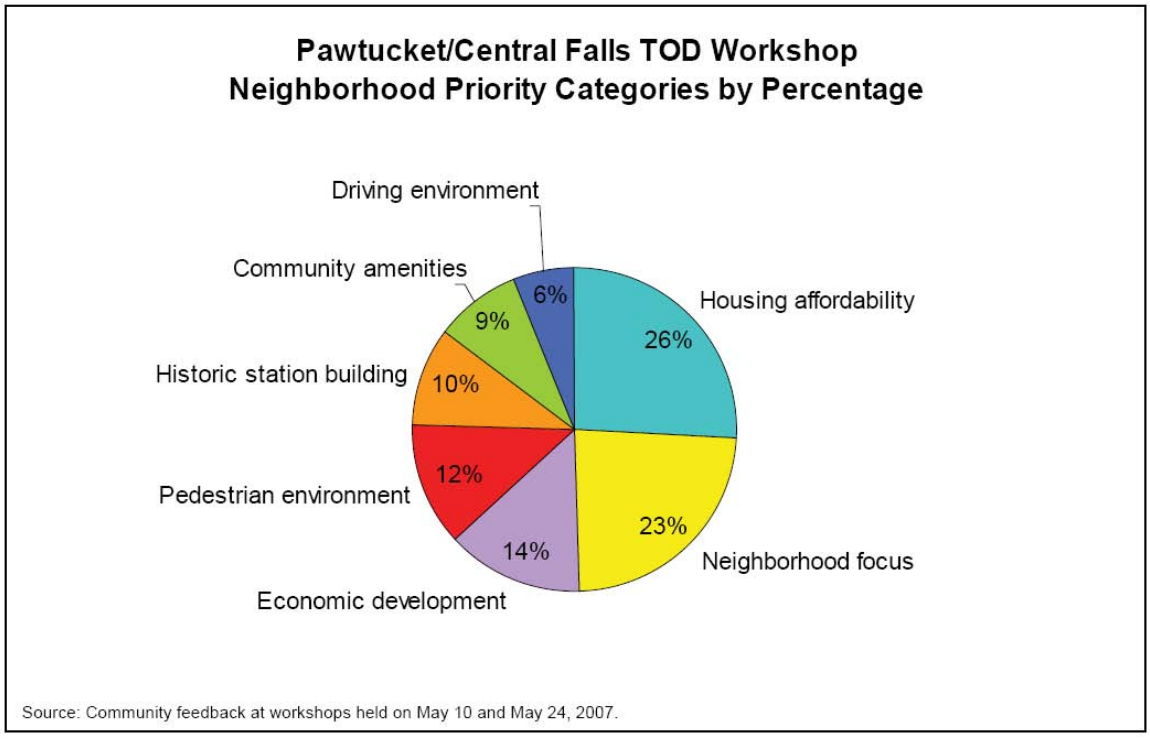


Figure 2



Traffic and Parking

The public was also invited to circulate through five informational stations. Nelson/Nygaard led the traffic and parking station, where people talked about their concerns related to traffic congestion, driving speed, and on-street parking availability. The community learned that traffic at TODs could be avoided by the following actions:

- Minimize station parking
- Improve pedestrian and bicycle access
- De-emphasize automobile access
- Accommodate bus access
- Provide a mix of uses nearby
- Increase density

The community placed dots on a map of the study area to show the locations where they encounter the worst traffic congestion and parking problems, as well as where they would consider commuter parking to be feasible, if the lots were publicly available. Figures 3, 4, and 5 list the identified traffic congestion areas, parking problems, and potential parking areas.

Figure 3 Traffic Congestion Locations

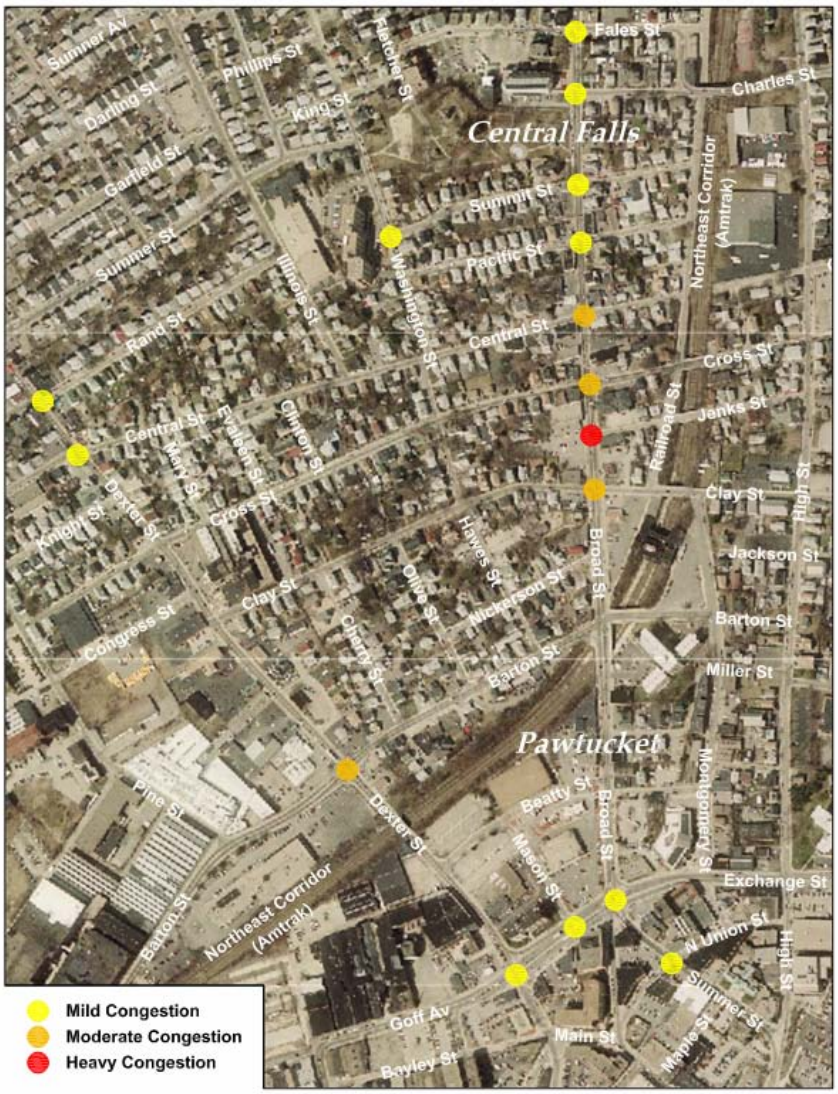


Figure 4 Parking Problem Locations

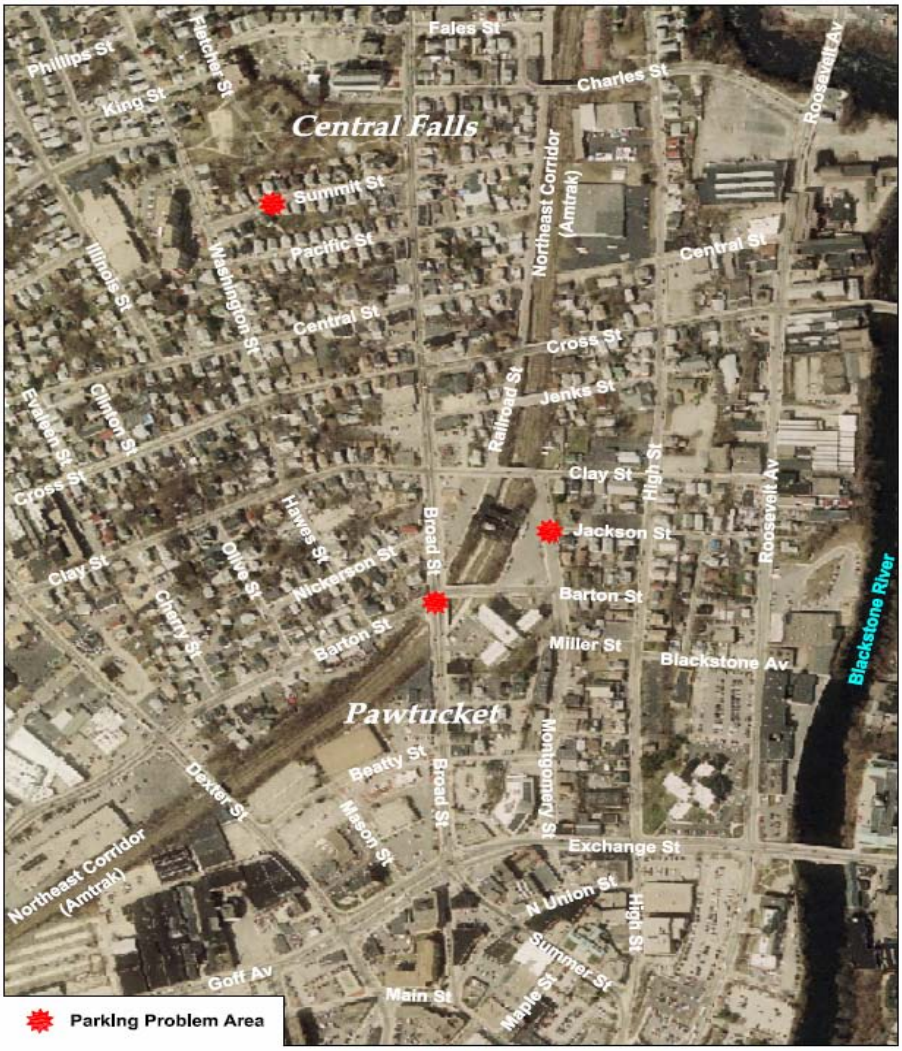
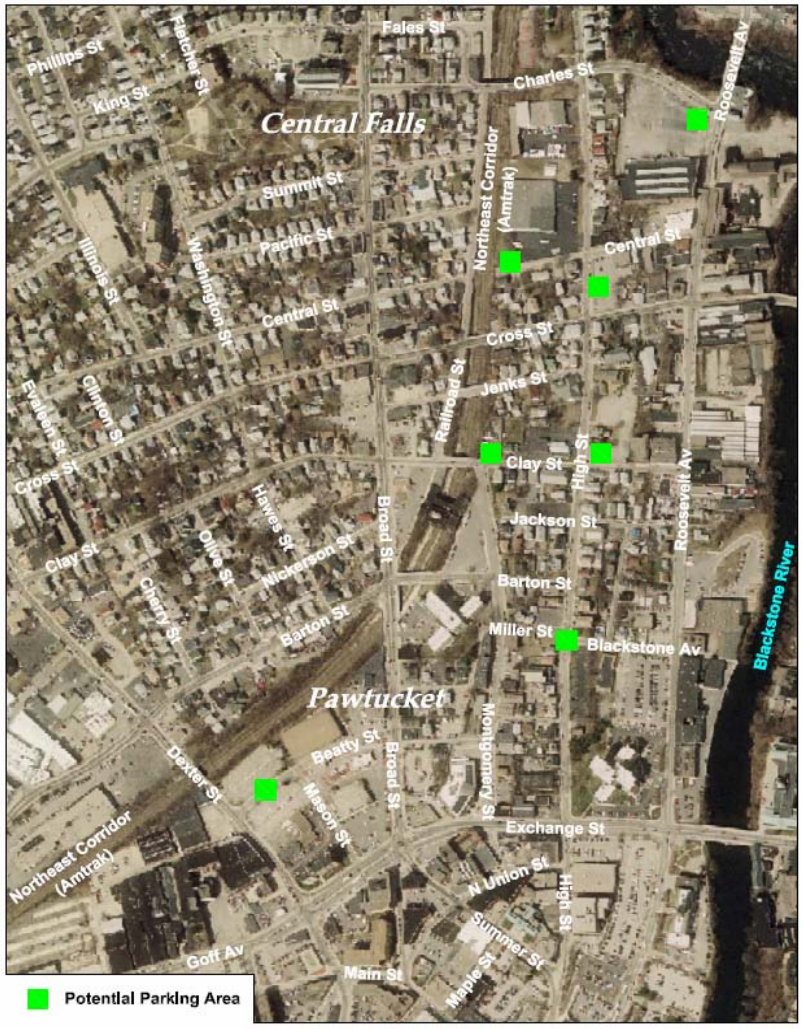


Figure 5 Potential Parking Areas



Economic Development

At the economic development station, neighbors expressed concerns over needing more job opportunities and preventing gentrification that might accompany a new commuter rail stop. They learned about economic development tools such as zoning, special districts, financing, capital expenditures, and marketing.

Commuter Rail Stop

The commuter rail stop informational station, run by VHB, contained drawings of the proposed station site plan. The intent of these renderings was to demonstrate that the historic station site could be redeveloped independent of the construction of a commuter rail stop, and that a stop would not require a large area.

Neighborhood Update

The neighborhood update station, run by Nancy Whit of PCDC, provided an overview of recent development activity in the neighborhood, including the El Salavdor Restaurant, Callaghan Gardens, 141 Montgomery Street, Phil's Catering, and the Barton Street Playground.

Safety

The safety station was staffed by two Pawtucket police officers, and addressed concerns such as unsafe pedestrian environments and unsafe individuals. Residents learned some ways to improve safety near TODs, including residents and businesses having their eyes on the street, a mix of uses generating 24-hour activity, pedestrian improvements eliminating dark or remote areas, and walking police patrols.

Attachments:

- Sign-In Sheet

NN/md

xc: Attendees, File

City of Pawtucket, Department of Planning and Redevelopment
The Pawtucket/Central Falls Commuter Rail Facility Feasibility Study and Site Analysis

Meeting Attendance Sheet – TOD Charette #2

Date: May 24, 2007	**Time:** 6:00 PM – 8:00 PM	**Location**: YWCA, 43 Hawes Street, Central Falls

Name	Representing	Address	Phone	E-mail
HARVEY GOULET	CITY OF PAWT	190 RANDALL ST	723-4515	
Deana Gill	City of Central Falls	15 Summit St		
Stephen Cabrey	Central Falls	15 Summit		
ELHADJ NIANG	CITY PAWT	11 NICKERSON ST	(401) 688 5305	
GEORGE JOHNSON	RI STATEWIDE PLANNING	ONE CAPITOL HILL PROVIDENCE RI	401-222-6490	gjohnson@planning.state.ri.us
Joy Patraca	CF PAW	200 Washington	4299262	

City of Pawtucket, Department of Planning and Redevelopment
The Pawtucket/Central Falls Commuter Rail Facility Feasibility Study and Site Analysis

Meeting Attendance Sheet – TOD Charette #2

Date: May 24, 2007	**Time:** 6:00 PM – 8:00 PM	**Location**: YWCA, 43 Hawes Street, Central Falls

Name	Representing	Address	Phone	E-mail
Luis Marcano	CF Pawt	227 Zone St	305-5366	

B

Appendix B: Traffic Analysis

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Traffic Evaluation

In order to assess the off-site traffic impacts associated with the two sites under consideration for the commuter rail facility, existing traffic conditions have been inventoried and evaluated. Existing conditions were projected to represent the background traffic conditions expected in the build-out year of 2010. The 2010 background traffic conditions were also evaluated. Trip generation and distribution for the two sites were estimated, and traffic was assigned to the surrounding street system. The traffic operations associated with the two "build" conditions were evaluated. Comparisons were made between the 2010 background traffic conditions and each of the build scenarios. The methodology and results of the projections, analyses, and comparisons are presented in this chapter.

Existing Traffic Conditions

To assess existing traffic conditions in the project study area, an inventory of the existing street system was conducted, traffic count data was collected, accident data was reviewed, and capacity analyses were conducted at key intersections.

Inventory of Existing Street System

Figure 1 shows the project area and the two alternative commuter station sites. The "Pawtucket/Central Falls Station Site" is on the Pawtucket/Central Falls line and is bounded by Broad Street, Clay Street, Montgomery Street and Barton Street. The second site is triangular in shape, referred to as the "P&W Yard Site," and is bounded by Amtrak rail line to the north and Conant Street to the west, and lies west and north of Pine Street and Goff Avenue.

The traffic analysis for the comparison of the two sites was planned around the key intersections in the vicinity of those locations. Given the urban environment in Pawtucket and Central Falls, it is the intersections on the street system that control traffic flow and the quality of traffic operations.

For this phase of the study, traffic counts were taken and analyses conducted at a total of sixteen intersections surrounding the alternative station locations. The key intersections

The existing street conditions were inventoried on the streets surrounding the two station station sites, utilizing the key intersections as reference points. Table 1 summarizes the main characteristics of the roadways at the key intersections in the study area. The characteristics noted include type of traffic control, functional classification of the streets, adjacent land uses, parking and pedestrian accommodations.

Table 1
Summary of Key Characteristics

No.	Intersection	Functional Classifications	Primary Land Use In Area	On Street Parking	Pedestrian Accommodations
1	Roosevelt Ave & Cross St	Roosevelt Ave - Minor Arterial, Cross St - Minor Arterial	Industrial	Parking is allowed on Roosevelt Ave. No Parking on Cross St	There is no pedestrian signal equipment or pedestrian phasing at this location
2	Roosevelt Ave & Clay St	Roosevelt Ave - Minor Arterial, Clay St - Local Street	Commercial	Parking is allowed on Roosevelt Ave & Clay St.	
3	Clay St & High St	Montgomery St - Local Street, Clay St - Local Street	Residential	Parking is allowed on the High St NB approach & on Clay St No Parking on the High St SB approach	
4	Montgomery St & Clay St	Clay St - Local Street, High St - Collector	Residential	Parking is allowed on Clay St & High St	
5	Montgomery St & Barton St	Montgomery St - Local Street, Barton St - Minor Arterial	Residential	No Parking on the Montgomery St SB approach. Parking is allowed on the Montgomery St NB approach & on Barton St.	
6	Exchange St & Montgomery St	Exchange St - Minor Arterial, Montgomery St - Local Street	Commercial	No Parking on the Exchange St EB approach. Parking is allowed on the Exchange St WB approach & on Montgomery St	There is pedestrian signal equipment and pedestrian phasing at this location
7	Broad St & Cross St	Broad St - Principal Arterial, Cross St - Minor Arterial	Commercial	No Parking on Broad St. No Parking on the Cross St WB approach	There is pedestrian signal equipment and an exclusive pedestrian phase at this location
8	Broad St & Clay St	Broad St - Principal Arterial, Clay St - Local Street	Commercial	Parking is allowed on Broad St & Clay St	
9	Broad St & Barton St	Broad St - Principal Arterial, Barton St - Minor Arterial	Commercial	No Parking on Broad St & Barton St	There is pedestrian signal equipment and pedestrian phasing at this location

10	Goff Ave/ Exchange St/ Broad St/ Summer St	Goff Ave- Minor Arterial, Broad St - Principal Arterial, Summer St - Principal Arterial	Commercial	No Parking on Goff Ave & Broad St & Summer St	There is pedestrian signal equipment and pedestrian phasing at this location
11	Barton St & Dexter St	Barton St - Minor Arterial, Dexter St - Principal Arterial	Commercial	No Parking on Barton St & Dexter St	There is pedestrian signal equipment and pedestrian phasing at this location
12	Goff Ave & Dexter St	Goff Ave - Minor Arterial, Dexter St - Principal Arterial	Commercial	No Parking on Goff Ave & Dexter St	There is pedestrian signal equipment and pedestrian phasing at this location
13	Main St & Pine St	Main St - Principal Arterial, Pine St - Minor Arterial	Commercial	No Parking on Main St & Pine St	There is no pedestrian signal equipment or pedestrian phasing at this location
14	Pine St & Church St	Pine St - Minor Arterial, Church St - Minor Arterial	Commercial	No Parking on Pine St & Church St	There is no pedestrian signal equipment or pedestrian phasing at this location
15	Main St & Mineral Spring Ave	Main St - Principal Arterial, Mineral Spring Ave - Principal Arterial	Commercial	No Parking on Mineral Spring Ave. Parking is allowed on Main St	There is no pedestrian signal equipment or pedestrian phasing at this location
16	Church St & Garden St	Main St - Principal Arterial, Garden St - Minor Arterial	Commercial	No Parking on Church St & on the Garden St SB approach	

*Note: All streets have sidewalks on both sides to accommodate pedestrians

= Unsignalized Intersection

= Signalized Intersection

Bus routes in the study area were inventoried. There are twelve bus routes through Pawtucket. The primary origin/destination is the Roosevelt Avenue stop near Main Street. The bus routes are summarized in Table 2.

Table 2

Summary of Bus Routes

Bus Route	Description	Origin/Destination	Number of Stops along Route	Weekday Frequency	Saturday Frequency	Sunday/ Holiday Frequency
42	Hope Street	Hope Street/Roosevelt Avenue	7	3/hour during day	Hourly during day	1/hour during day
51	Charles Street	Charles Street/Roosevelt Ave.	7	Limited runs in peak hours	No Service	No Service
75	Dexter/Lincoln Mall	Lincoln Mall/Roosevelt Ave.	8	1/hour during day	1/hour during day	1/hour during day
76	Central Avenue	Central Avenue/Roosevelt Ave.	3	1-3/hour during day	1-2/hour during day	1/1.5 hour during day
77	Benefit/Broadway	Benefit St/Roosevelt Ave	5	1-3/hour during day	1-2/hour during day	1/hour during day
78	Beverage Hill	Kennedy Plaza/Roosevelt Ave	10	1/hour during day	1/hour during day	1/1.5 hour during day
71-99	71=Broad St, 99=Providence	Mendon Rd/Saylesville Industrial Park/Roosevelt Ave	7	1-2/hour during day	1/hour during day	1/1.5 hour during day
73	Mineral Spring	Mineral Spring Ave/Roosevelt Ave	5	1-2/hour during day	1/hour during day	No Service
79	Columbus Ave	Coutney/Roosevelt Avenue	4	1-2/hour during day	1/hour during day	No Service
80	Armistice Blvd.	Armistice Blvd./Roosevelt Ave.	5	1-2/hour during day	1/hour during day	No Service

Existing Traffic Volumes

Traffic count data was collected in the project area. Manual turning movement counts were collected at key intersections on weekdays in late May and early June of 2006. The counts were collected in 15-minute increments from 7-9 AM and 4-6 PM. A system wide peak hour was identified as 7:45-8:45 AM and 4:15-5:15 PM. The existing count data for the peak hours are shown in Figures 2 and 3 for the AM and PM peak hour respectively.

Accident Analysis

Accident data was requested from the Pawtucket Police Department and the Central Falls Police Department. The Pawtucket Police Department provided accident data for key intersections in the study area from January 1, 2003 to September 25, 2006. The Central Falls Police Department provided accident data for its key intersections for the period of January 1, 2003 to September 18, 2006. Table 2 summarizes the number of accidents that occurred at each of the intersections under review:

Table 3
Summary of Accident Data

Pawtucket Intersections	Number of accidents over last 3.75 years	Number of accidents per year
Dexter St & Goff Ave	37	10
Barton St & Dexter St	50	13
Broad St & Goff Ave	20	5
Barton St & Broad St	41	11
Exchange St & Montgomery St	11	3
Barton St & Montgomery St	4	1
Mineral Spring Ave & Main St	8	2
Church St & Pine St	21	6
Main St & Pine St	14	4

Central Falls Intersections	Number of accidents over last 3.75 years	Number of accidents per year
Broad St & Clay St	43	11
Broad St & Cross St	38	10
Clay St & High St	15	4
Roosevelt Ave & Clay St	7	2
Roosevelt Ave & Cross St	20	5

Locations with five or more accidents in a twelve-month period are typically selected for further study, as stated in the Transportation and Traffic Engineering Handbook published by the Institute of Transportation Engineers. Accident rates have been calculated for the locations with five or more accidents per year. Accident rates provide a relationship between the number of accidents at a particular location and the number of vehicles passing through that location. Accident rates for intersections are expressed as the number of accidents per million entering vehicles (MEV). Typically, accident rates greater than 1.5 accidents per MEV warrant further consideration. Table 4 summarizes the accident rates.

Table 4

Summary of Accident Rates

Intersection	Number of Accidents per year	Accident Rate (Number of accidents per MEV)
Roosevelt Ave & Cross St	5.33	1.29
Broad St & Cross St	10.13	2.28
Broad St & Clay St	11.47	1.99
Barton St & Broad St	10.93	2.15
Broad St & Goff Ave & Summer St	5.33	0.83
Barton St & Dexter St	13.33	1.84
Dexter St & Goff Ave	9.87	1.49
Church St & Pine St	5.60	1.63

As shown in Table 3, five intersections were found to have accident rates greater than 1.5 accidents per MEV. These locations include:

- Broad Street & Cross Street
- Broad Street & Clay Street
- Barton Street & Broad Street
- Barton Street & Dexter Street
- Church Street & Pine Street.

The results of the accident analysis will be useful in the next phase of the project when off-site improvements are being considered. Once a preferred

station site has been idenitified, the intersections with high accident rates will be reviewed and considered for off-site improvements if the proposed station adds significant traffic to these intersections.

Capacity Analysis of Existing Conditions

The 2006 AM and PM peak hour traffic conditions were analyzed in terms of capacity analyses. The analyses were conducted for the key intersections.

The capacity analyses were conducted using the procedures contained in the 2000 Highway Capacity Manual (HCM). The adequacy of traffic operations on any given section of roadway or at a particular intersection is expressed in terms of its "level of service." The concept of level of service is a qualitative measure describing operational conditions within a traffic stream and their perception by motorists and/or passengers. A level-of-service definition generally describes these conditions in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety.

For analysis purposes, level of service is expressed with letter designations as a range of A through F, with "A" representing the best conditions and "F" representing the worst. Level of service A can generally be described as a condition of free flow with very little delay experienced by the driver, and virtually no interference from other vehicles. Level of service F, on the other hand, is a forced flow condition, with "stop and go" traffic, excessive backups at traffic signals and undue delay and inconvenience to the motorists. Within these two extremes, level of service C represents a condition of stable operation.

Level of service (LOS) at an intersection is based on the average vehicle delay. At a signalized intersection, LOS is as follows:

LOS A - less than 10 seconds

LOS B - 10-20 seconds

LOS C - 20-35 seconds

LOS D - 35-55 seconds

LOS E - 55-80 seconds

LOS F - greater than 80 seconds

The delay range for each LOS at an unsignalized intersection is as follows:

LOS A - less than 10 seconds

LOS B - 10-15 seconds

LOS C - 15-25 seconds

LOS D - 25-35 seconds

LOS E - 35-50 seconds

LOS F - greater than 50 seconds

The results of the capacity analyses for the existing conditions are shown in Tables 5-8 with Tables 5 and 6 displaying the AM peak hour results for the unsignalized and signalized intersections, respectively, and Tables 7 and 8 showing the PM peak hour results for the unsignalized and signalized intersections, respectively.

TABLE 5
SUMMARY OF UNSIGNALIZED INTERSECTIONS CAPACITY ANALYSIS RESULTS
AM PEAK HOUR

UNSIGNALIZED INTERSECTIONS	LEVEL OF SERVICE/AVGERAGE DELAY (Sec./Veh.)			
	2006 EXISTING	2010 NO-BUILD	PAWT/CF STATION SITE	P&W YARD SITE
1. ROOSEVELT ST & CLAY ST				
CLAY ST EB	B/11.1	B/11.2	B/12.1	B/11.4
2. CLAY ST & HIGH ST				
CLAY ST EB	B/10.9	B/11.0	B/12.3	B/11.1
HIGH ST SB LEFT	A/0.3	A/0.3	A/0.2	A/0.3
3. MONTGOMERY ST & CLAY ST				
MONTGOMERY ST NB RIGHT	A/9.1	A/9.2	A/9.4	A/9.2
4. MONTGOMERY ST & BARTON ST				
BARTON ST EB	A/9.2	A/9.3	B/11.7	A/9.3
BARTON ST WB	A/9.8	A/9.8	B/10.6	A/9.8
MONTGOMERY ST NB LEFT	A/3.6	A/3.6	A/3.6	A/3.6
5. BROAD ST & CLAY ST				
CLAY ST EB	D/34.2	E/47.9	F/121.2	F/67.6
BROAD ST SB LEFT	A/8.4	A/8.6	A/8.6	A/8.6
6. CHURCH ST & GARDEN ST				
GARDEN ST SB	B/13.9	B/14.2	C/17.5	C/17.6

TABLE 6
SUMMARY OF SIGNALIZED INTERSECTIONS CAPACITY ANALYSIS RESULTS
AM PEAK HOUR

		LEVEL OF SERVICE/AVGERAGE CONTROL DELAY (Sec./Veh.)			
	SIGNALIZED INTERSECTIONS	2006 EXISTING	2010 NO-BUILD	CF/PAWT RAIL SITE	P&W RAIL SITE
1.	**ROOSEVELT ST & CROSS ST**				
	CROSS ST EB	A/8.7	A/8.7	A/8.2	A/8.7
	CROSS ST WB	A/9.8	A/9.8	B/12.3	A/9.8
	ROOSEVELT AVE NB	A/9.2	A/9.4	B/10.9	A/9.5
	ROOSEVELT AVE SB	B/10.7	B/10.9	B/12.7	B/11.6
	OVERALL INTERSECTION	A/9.7	A/9.8	B/11.4	B/10.1
2.	**MONTGOMERY ST & EXCHANGE ST**				
	EXCHANGE ST EB	A/1.2	A/1.3	A/1.1	A/2.5
	EXCHANGE ST WB	A/3.1	A/3.5	A/3.3	A/7.0
	MONTGOMERY ST SB	D/50.2	D/45.2	D/50.1	D/53.3
	OVERALL INTERSECTION	A/9.3	A/8.5	A/9.0	B/10.7
3.	**BROAD ST & CROSS ST**				
	CROSS ST WB	C/21.2	C/21.7	C/21.7	C/21.7
	BROAD ST NB	C/20.5	C/24.2	D/45.3	C/25.7
	BROAD ST SB	B/10.5	B/10.9	B/12.2	B/12.0
	OVERALL INTERSECTION	B/16.5	B/18.2	C/26.4	B/19.0
4.	**BROAD ST & BARTON ST**				
	BARTON ST EB	B/16.8	B/16.9	B/17.5	B/16.9
	BARTON ST WB	B/13.4	B/13.3	B/13.1	B/13.3
	BROAD ST NB	A/8.8	A/8.9	B/10.3	A/9.2
	BROAD ST SB	B/12.0	B/12.4	B/13.3	B/13.6
	OVERALL INTERSECTION	B/12.2	B/12.3	B/12.9	B/12.8
5.	**BROAD ST & GOFF AVE/ EXCHANGE ST**				
	GOFF AVE EB	A/9.2	B/16.1	C/33.5	B16.6
	EXCHANGE ST WB	C/28.4	D/43.2	D/54.8	D/41.4
	BROAD ST NB	E/60.8	E/61.2	E/71.6	E/74.1
	BROAD ST SB	E/70.4	D/35.7	E/76.6	F/148.9
	OVERALL INTERSECTION	D/44.6	D/41.2	E/58.0	E/66.6
6.	**BARTON ST & DEXTER ST**				
	BARTON ST EB	C/22.2	C/30.5	C/30.9	C/30.5
	BARTON ST WB	C/26.0	C/26.9	C/27.9	C/26.9
	DEXTER ST SB	A/9.6	A/9.8	A/9.9	B/12.2
	DEXTER ST NB	B/13.2	B/14.2	B/14.2	B/17.5
	OVERALL INTERSECTION	B/17.0	B/19.9	C/20.3	C/20.8
7.	**DEXTER ST & GOFF AVE**				
	GOFF AVE EB	D/36.2	C/30.6	C/27.5	C/31.4
	GOFF AVE WB	B/12.2	A/6.7	C/70.4	B/19.4
	DEXTER ST SB	D/50.7	D/45.2	D/50.9	D/53.8
	DEXTER ST NB	C/34.0	C/30.6	D/33.8	C/33.4
	OVERALL INTERSECTION	C/32.3	C/26.9	C/32.4	C/33.3
8.	**MAIN ST & PINE ST**				
	MAIN ST WB	C/23.7	C/23.6	C/23.6	A/8.4
	PINE ST NB	A/3.8	A/3.9	A/4.7	A/8.1
	PINE ST SB	A/4.8	A/5.0	A/5.2	B/13.8
	OVERALL INTERSECTION	A/5.6	A/5.7	A/6.0	A/9.3
9.	**CHURCH ST & PINE ST**				
	CHURCH ST EB	B/12.2	B/12.3	B/12.7	B/12.7
	PINE ST NB	A/7.0	A/7.0	A/7.6	A/7.6
	OVERALL INTERSECTION	A/9.6	A/9.7	B/10.6	B/10.7
10.	**MINERAL SPRING AVE & MAIN ST**				
	MINERAL SPRING AVE EB	B/16.3	B/16.4	B/16.4	C/21.7
	MAIN ST NB	A/6.9	A/7.0	A/8.0	A/9.1
	MAIN ST SB	A/8.1	A/8.5	A/8.5	B/10.9
	OVERALL INTERSECTION	B/10.6	B/10.9	B/10.5	B/15.3

TABLE 7
SUMMARY OF UNSIGNALIZED INTERSECTIONS CAPACITY ANALYSIS RESULTS
PM PEAK HOUR

UNSIGNALIZED INTERSECTIONS	LEVEL OF SERVICE/AVERAGE DELAY (Sec./Veh.)			
	2006 EXISTING	2010 NO-BUILD	PAWT/CF STATION SITE	P&W YARD SITE
1. ROOSEVELT ST & CLAY ST				
CLAY ST EB	B/13.3	B/13.5	C/21.4	B/13.9
2. CLAY ST & HIGH ST				
CLAY ST EB	B/14.4	B/14.7	E/39.6	B/11.9
HIGH ST SB LEFT	A/1.2	A/1.1	A/1.1	A/1.1
3. MONTGOMERY ST & CLAY ST				
MONTGOMERY ST NB RIGHT	B/10.0	B/10.1	B/12.9	B/10.1
4. MONTGOMERY ST & BARTON ST				
BARTON ST EB	B/10.7	B/10.8	B/13.0	B/10.8
BARTON ST WB	B/10.6	B/10.7	B/11.0	B/10.7
MONTGOMERY ST NB LEFT	A/3.7	A/3.8	A/3.8	A/3.8
5. BROAD ST & CLAY ST				
CLAY ST EB	D/26.4	E/36.0	F/102.2	E/37.5
BROAD ST SB LEFT	A/9.2	A/9.4	A/9.8	A/9.0
6. CHURCH ST & GARDEN ST				
GARDEN ST SB	C/17.1	C/18.3	C/19.2	C/19.2

TABLE 8
SUMMARY OF SIGNALIZED INTERSECTIONS CAPACITY ANALYSIS RESULTS
PM PEAK HOUR

		LEVEL OF SERVICE/AVGERAGE CONTROL DELAY (Sec./Veh.)			
	SIGNALIZED INTERSECTIONS	2006 EXISTING	2010 NO-BUILD	CF/PAWT RAIL SITE	P&W RAIL SITE
1.	**ROOSEVELT ST & CROSS ST**				
	CROSS ST EB	B/10.3	B/10.4	B/10.4	B/10.4
	CROSS ST WB	A/9.3	A/9.3	A/9.4	A/9.3
	ROOSEVELT AVE NB	B/12.4	B/12.7	B/15.1	B/13.3
	ROOSEVELT AVE SB	B/11.1	B/11.5	B/11.9	B/11.6
	OVERALL INTERSECTION	B/10.8	B/11.0	B/12.0	B/11.3
2.	**MONTGOMERY ST & EXCHANGE ST**				
	EXCHANGE ST EB	A/1.7	A/1.7	A/1.8	A/2.0
	EXCHANGE ST WB	A/2.5	A/2.7	A/2.7	A/2.9
	MONTGOMERY ST SB	D/52.9	D/52.8	D/52.8	D/52.8
	OVERALL INTERSECTION	B/14.0	B/13.3	B/13.3	B/11.3
3.	**BROAD ST & CROSS ST**				
	CROSS ST WB	C/27.2	C/28.7	C/28.7	C/28.7
	BROAD ST NB	A/9.6	B/10.3	E/64.9	B/10.3
	BROAD ST SB	B/10.1	B/11.3	B/11.6	B/11.6
	OVERALL INTERSECTION	B/14.1	B/15.1	D/37.0	B/15.2
4.	**BROAD ST & BARTON ST**				
	BARTON ST EB	B/19.5	C/20.1	C/20.2	C/20.1
	BARTON ST WB	B/13.4	B/13.4	B/13.4	B/13.4
	BROAD ST NB	B/10.4	B/10.8	B/11.4	B/10.8
	BROAD ST SB	B/14.2	B/15.4	C/24.8	B/15.7
	OVERALL INTERSECTION	B/14.1	B/14.7	B/18.6	B/14.8
5.	**BROAD ST & GOFF AVE/ EXCHANGE ST**				
	GOFF AVE EB	B/12.3	B/12.5	B/13.5	B/17.5
	EXCHANGE ST WB	C/31.3	C/34.6	D/35.9	D/36.1
	BROAD ST NB	E/57.9	E/66.7	F/102.7	F/102.7
	BROAD ST SB	E/59.5	E/66.4	F/114.3	F/115.8
	OVERALL INTERSECTION	D/43.1	D/49.1	E/76.7	E/71.5
6.	**BARTON ST & DEXTER ST**				
	BARTON ST EB	C/31.0	D/40.6	D/42.1	D/40.6
	BARTON ST WB	C/29.0	C/30.2	C/31.8	C/30.2
	DEXTER ST SB	B/12.5	B/13.2	B/13.2	B/13.2
	DEXTER ST NB	E/77.3	F/95.7	F/97.1	F/95.7
	OVERALL INTERSECTION	D/40.8	D/49.5	D/50.6	D/49.5
7.	**DEXTER ST & GOFF AVE**				
	GOFF AVE EB	D/40.8	D/39.0	D/37.5	C/33.4
	GOFF AVE WB	B/14.6	B/15.2	C/20.2	C/25.6
	DEXTER ST SB	D/52.8	D/53.5	D/53.5	D/54.4
	DEXTER ST NB	D/36.7	D/36.0	D/36.0	D/35.6
	OVERALL INTERSECTION	C/33.9	C/33.3	C/34.0	D/35.8
8.	**MAIN ST & PINE ST**				
	MAIN ST WB	B/17.9	B/17.8	B/17.8	B/17.5
	PINE ST NB	A/5.5	A/5.6	A/5.8	A/5.8
	PINE ST SB	A/6.0	A/6.2	A/8.1	A/8.1
	OVERALL INTERSECTION	A/7.4	A/7.5	A/8.3	A/8.3
9.	**CHURCH ST & PINE ST**				
	CHURCH ST EB	B/12.0	B/12.1	B/12.2	B/12.2
	PINE ST NB	A/7.1	A/7.2	A/7.2	A/7.2
	OVERALL INTERSECTION	A/9.6	A/9.7	A/9.9	A/9.9
10.	**MINERAL SPRING AVE & MAIN ST**				
	MINERAL SPRING AVE EB	B/15.8	B/16.2	B/16.2	B/16.2
	MAIN ST NB	A/6.8	A/7.1	A/7.2	A/7.1
	MAIN ST SB	A/8.3	A/8.8	A/9.1	B/10.1
	OVERALL INTERSECTION	A/10.0	B/10.6	B/10.5	B/11.1

Projected Traffic Conditions

Existing traffic volumes were first projected to represent 2010. Projected ridership information was then used to estimate the trip generation for each of the proposed station sites. The distribution of the station-related traffic was estimated, and the traffic was assigned to the surrounding street network. The future build scenarios were analyzed in terms of capacity analyses. The methodologies employed and the results obtained are presented below.

2010 Background Traffic

Existing traffic volumes in the study area were projected to represent 2010 by a two-step process. First, existing traffic volumes were increased by an annual growth rate of 0.5% per year, which is a typical growth rate for an urbanized area. The growth rate was recommended by the Rhode Island Statewide Planning Program (RISPP) and was based upon growth analyses that have been conducted in relation to the statewide traffic model.

Secondly, known developments in the area were identified. The Pawtucket Department of Planning and Redevelopment noted the conversion of two mills on Goff Avenue which will result in approximately 300 residential units. Trip generation and distribution were estimated for these residential units and the trips were superimposed on the traffic flow map for 2010. The resultant 2010 traffic conditions are referred to as 2010 "background" traffic and are shown in Figures 4 and 5 for the AM peak hour and the PM peak hour, respectively.

Commuter Station Site-Generated Traffic

The trip generation of the two proposed station sites was estimated based upon the projected ridership for each site. A high and a low estimate of ridership in the peak period were generated for each site. For the purposes of the traffic analysis, the following assumptions were made:

- The peak period consists of two hours. The peak hour comprises 60% of the peak period ridership,
- Vehicle occupancy rate is 1.1 persons/vehicle,
- The high estimate was used in the traffic analysis to provide a conservative analysis,
- Of the trips generated, 84% are assumed to be park and ride users. The remaining 16% of the transit riders are referred to as

"kiss and ride" users since they are dropped off and picked up at the station.

In the peak hours, the two sites are expected to generate the following traffic volumes:

	Enter	Exit
AM Peak Hour		
Central Falls/Pawtucket Station Site	567	91
P&W Yard Site	655	105
PM Peak Hour		
Central Falls/Pawtucket Station Site	91	567
P&W Yard Site	105	655

Trip Distribution

The trip distribution for the trips generated by each of the station alternatives was estimated based upon the projected ridership information. Ridership was estimated using the Rhode Island Traffic Analysis Zones (TAZ) of the statewide model. The likely travel route for each of the TAZs with potential ridership was identified. The amount of traffic on the routes to and from each station was accumulated. The trip distribution is shown graphically in Figure 6 for the Pawtucket/Central Falls Station Site and in Figure 7 for the P&W Yard Site.

2010 Build Traffic Volumes

The trips expected to be generated by the Pawtucket/Central Falls Station Site have been distributed to the surrounding street network for the AM and PM peak hour conditions. The site traffic was then superimposed upon the 2010 background traffic. The resultant traffic volumes are shown in Figures 8 and 9.

Likewise, the trips expected to be generated by the P&W Yard Site were distributed to the surrounding street system. The site generated traffic was superimposed on the 2010 background traffic. Figure 10 shows the 2010 AM

peak hour traffic volumes with the P&W Yard Site and Figure 11 shows the 2010 PM peak hour traffic volumes.

Capacity Analysis for Projected Conditions

The projected 2010 traffic conditions at key intersections were analyzed in terms of capacity analyses. The 2010 scenarios evaluated include:

- Background Traffic Conditions
- Build Pawtucket/Central Falls Station Site
- Build P&W Yard Site

The scenarios were each evaluated for the AM and PM peak hour conditions. The results of the capacity analyses are summarized in Tables 5-8.

As the results indicate, the intersection levels of service at most of the locations analyzed do not change significantly. Typically, LOS "D" and better is acceptable in an urbanized area. At a number of the intersections analyzed, the overall LOS reduces by one grade with the commuter station traffic added. However, the resultant intersection LOS remains LOS "D" or better.

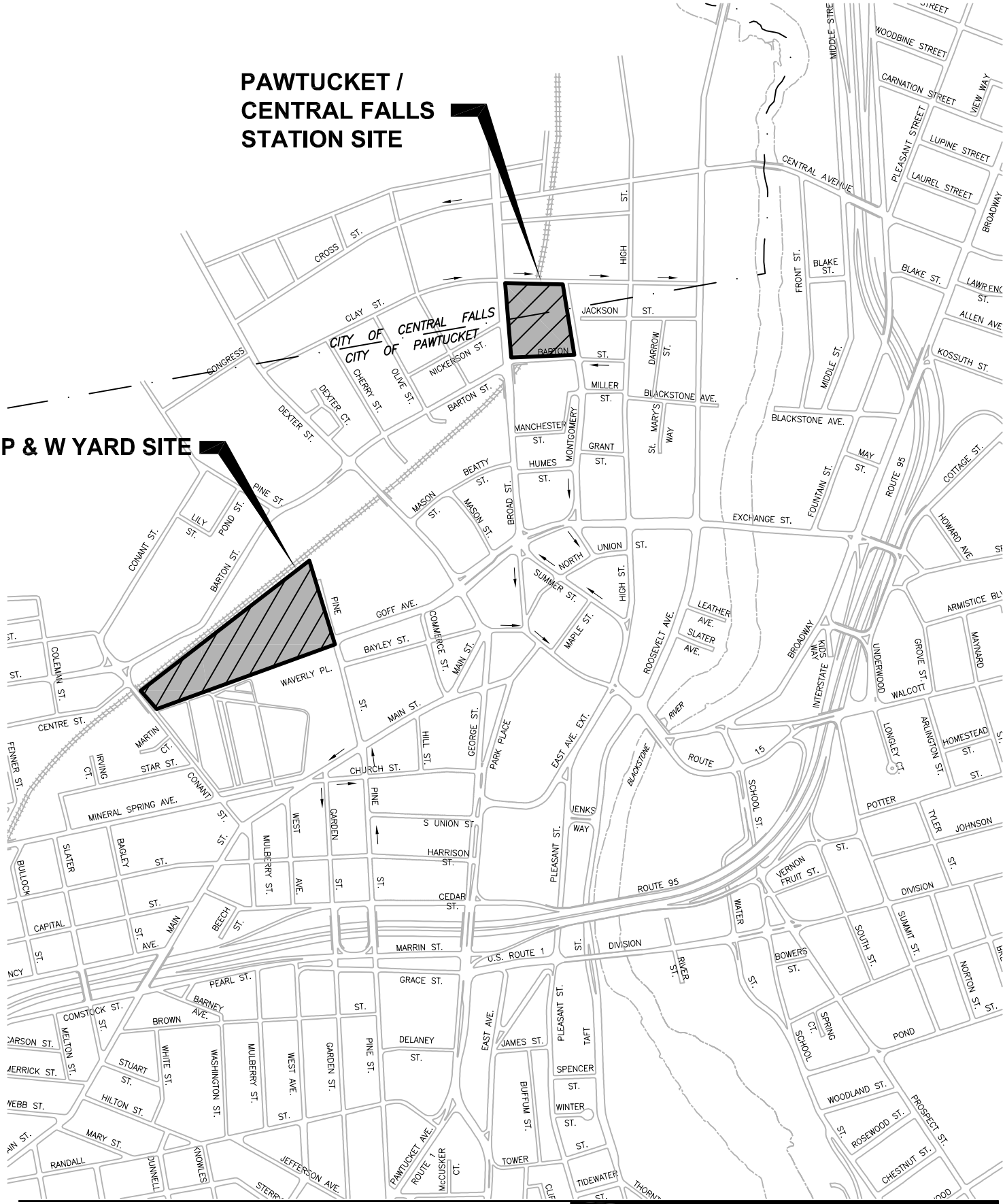
There are two intersections that resulted in a LOS reduction to "E" or "F"with the commuter station traffic, and the results were the same for each of the proposed station sites. At the unsignalized intersection of Broad Street and Clay Street, the Clay Street eastbound approach reduces from LOS "E" to "F" in the peak hours with the station traffic. The overall LOS at the signalized intersection of Broad Street/Goff Avenue/Exchange Street reduces from LOS "D" to LOS "E" in the peak hours with the station traffic.

At the signalized intersection of Broad Street/Cross Street, the overall LOS reduces two grades from LOS "B" to LOS "D" in the PM peak hour with the projected traffic from the Pawtucket/Central Falls Station Site. This is due largely to the increase traffic flow for the northbound left turn.

Based on the overall results of the capacity analysis, the projected station traffic will influence traffic operations at key intersections surrounding the sites. With the exception of the two intersections described above, the resultant LOS at nearby intersections is acceptable. The traffic impacts associated with each of the two station sites are very similar. When compared, neither of the two proposed station sites results in superior traffic operations.

The results of the capacity analyses are useful for identifying potential off-site improvement locations. Improvements should be considered at the

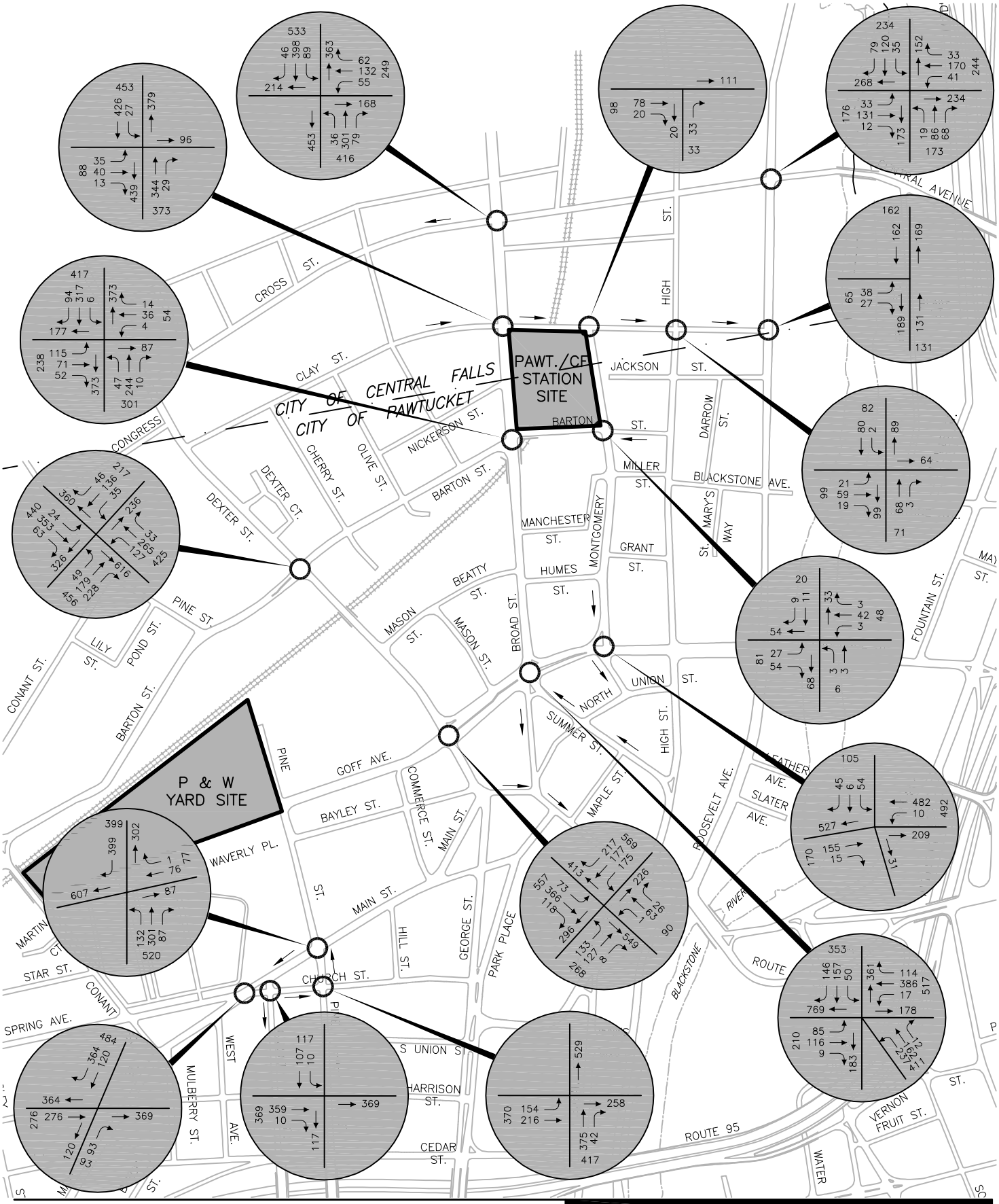
intersections of Broad Street/Clay Street and Broad Street/Goff Avenue/Exchange Street for both of the station sites. If the Pawtucket/Central Falls site is identified as the preferred site, then off-site improvements may also be considered at Broad Street/Cross Street.



Pawtucket/Central Falls Commuter Rail Facility
Feasibility Study and Site Analysis

Figure 1

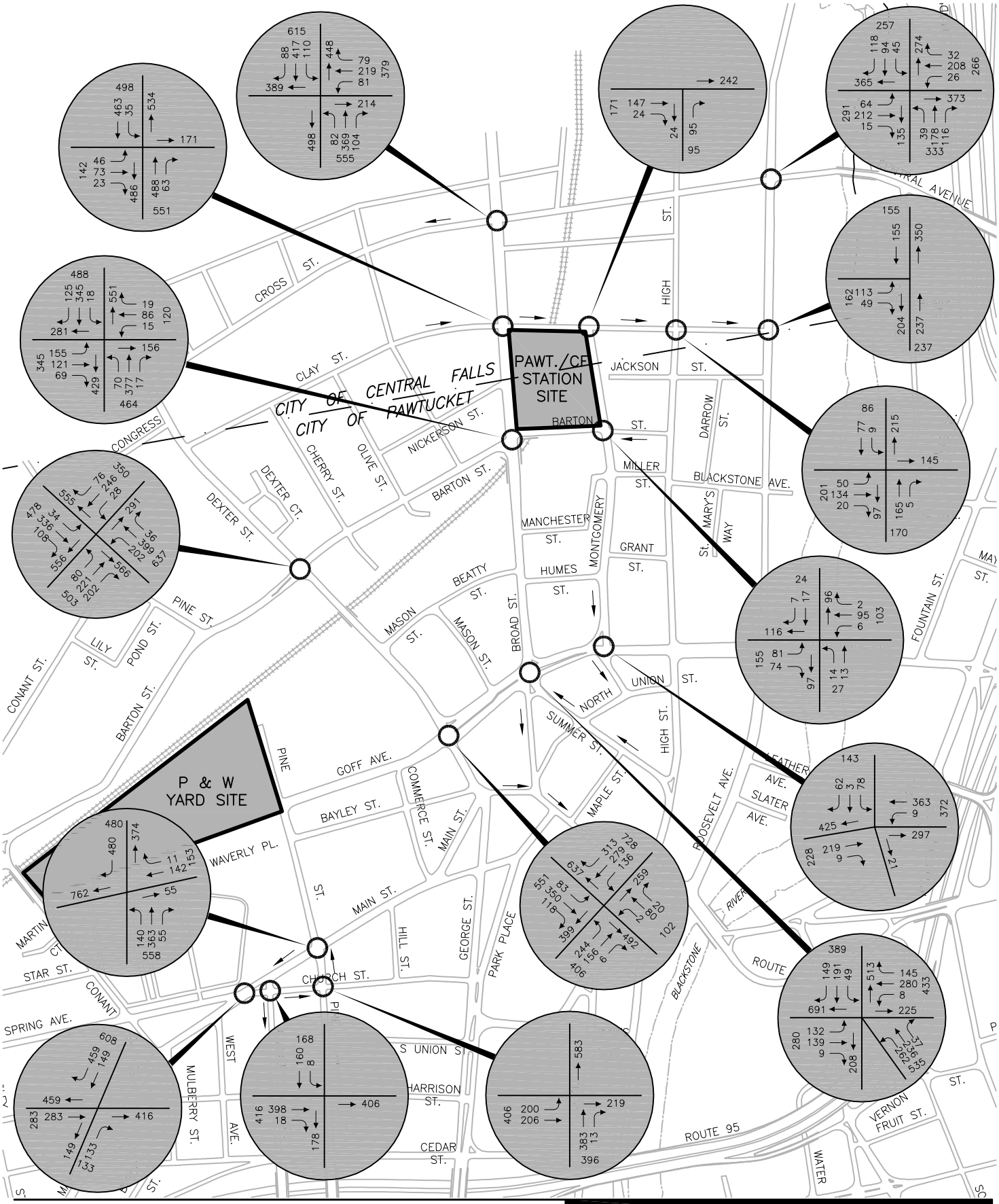
Project Area



Pawtucket/Central Falls Commuter Rail Facility
Feasibility Study and Site Analysis

Figure 2

2006 AM Peak Hour Traffic
Existing Conditions

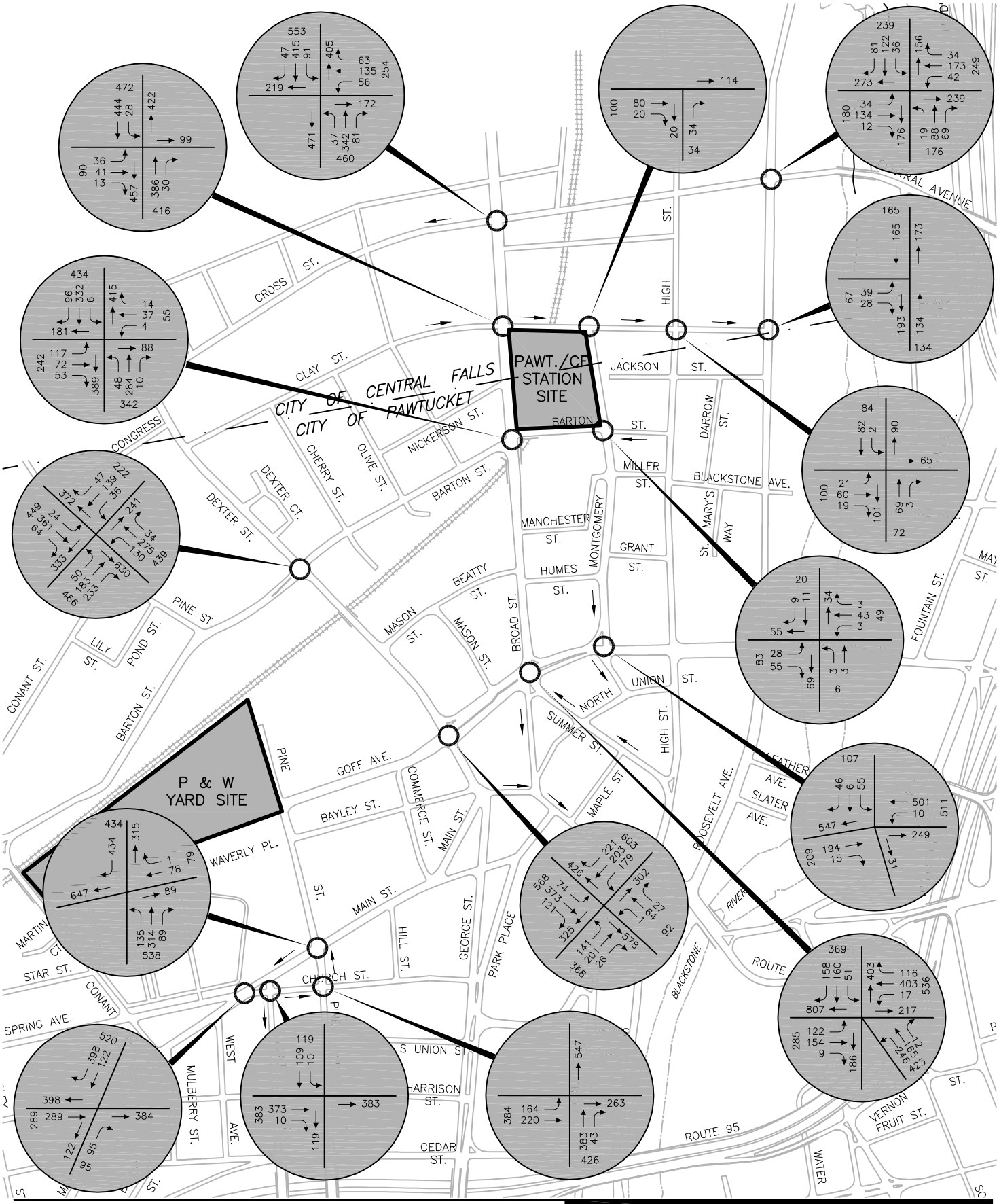


Pawtucket/Central Falls Commuter Rail Facility
Feasibility Study and Site Analysis

Figure 3

2006 PM Peak Hour Traffic
Existing Conditions

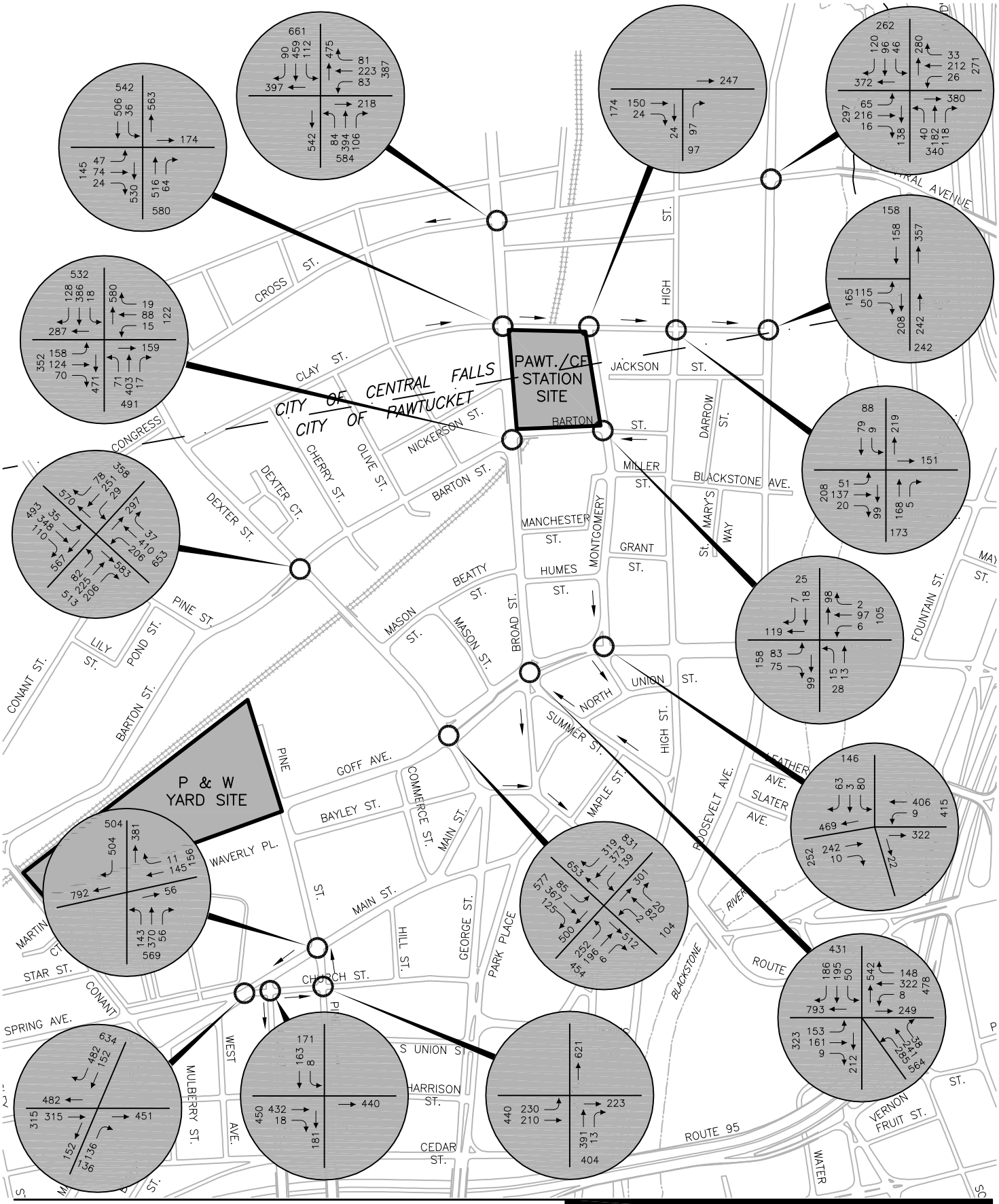
0 300 600 Feet



Pawtucket/Central Falls Commuter Rail Facility
Feasibility Study and Site Analysis

Figure 4

2010 AM Peak Hour Background Traffic

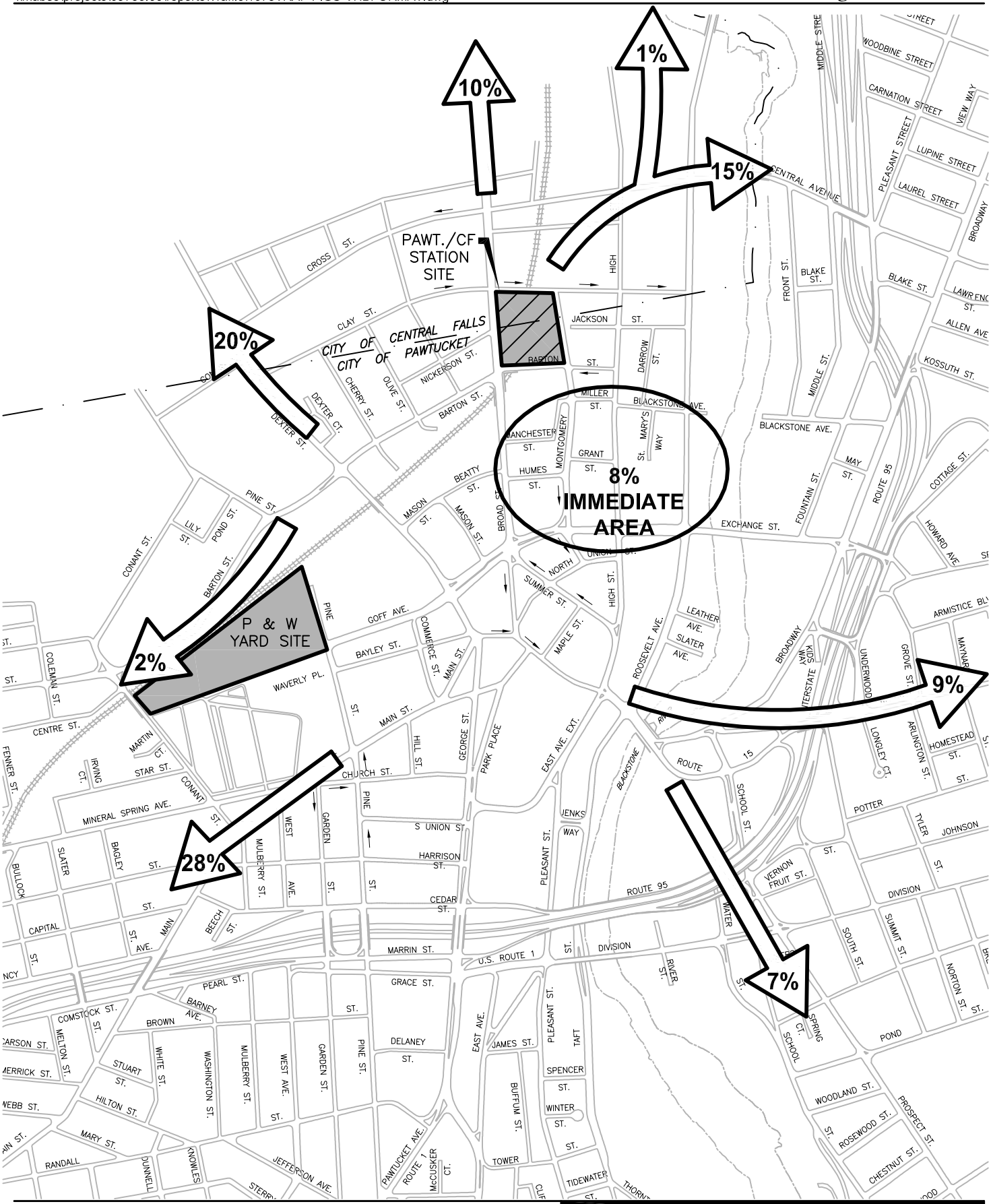


0 300 600 Feet

Pawtucket/Central Falls Commuter Rail Facility
Feasibility Study and Site Analysis

Figure 5

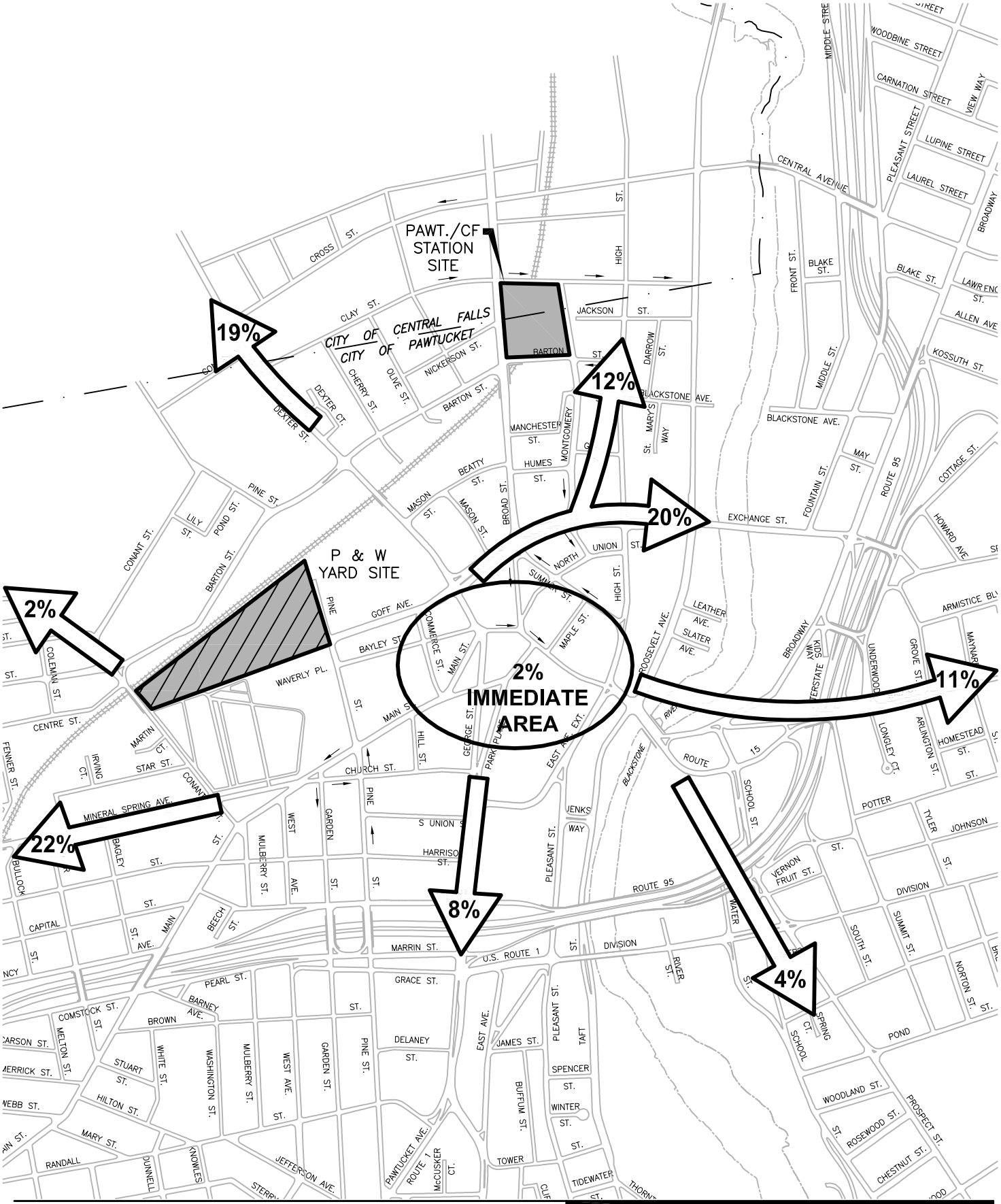
2010 PM Peak Hour Background Traffic



Pawtucket/Central Falls Commuter Rail Facility
Feasibility Study and Site Analysis

Figure 6

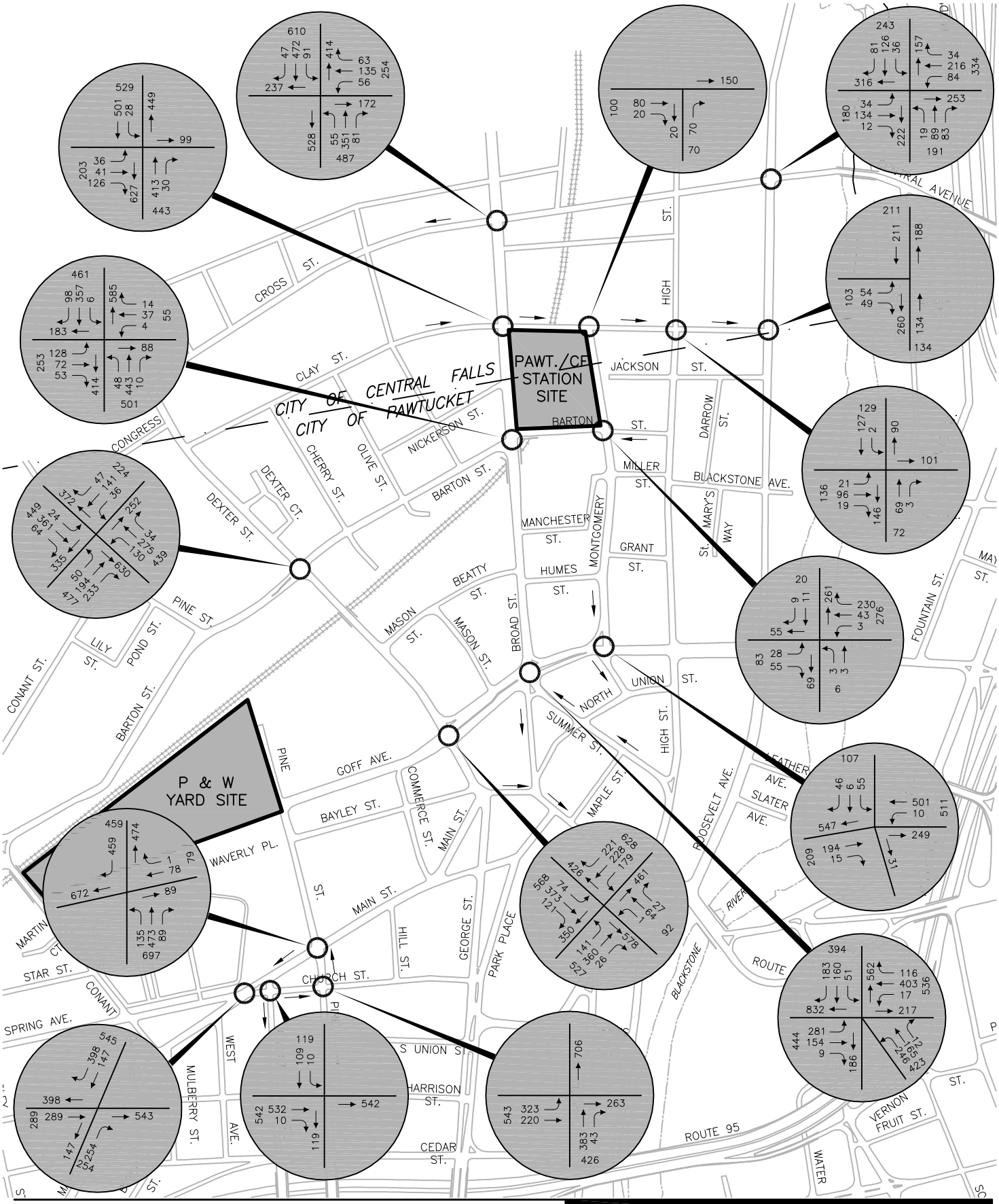
Trip Distribution for
Pawtucket / Central Falls Station Site



Pawtucket/Central Falls Commuter Rail Facility
Feasibility Study and Site Analysis

Figure 7

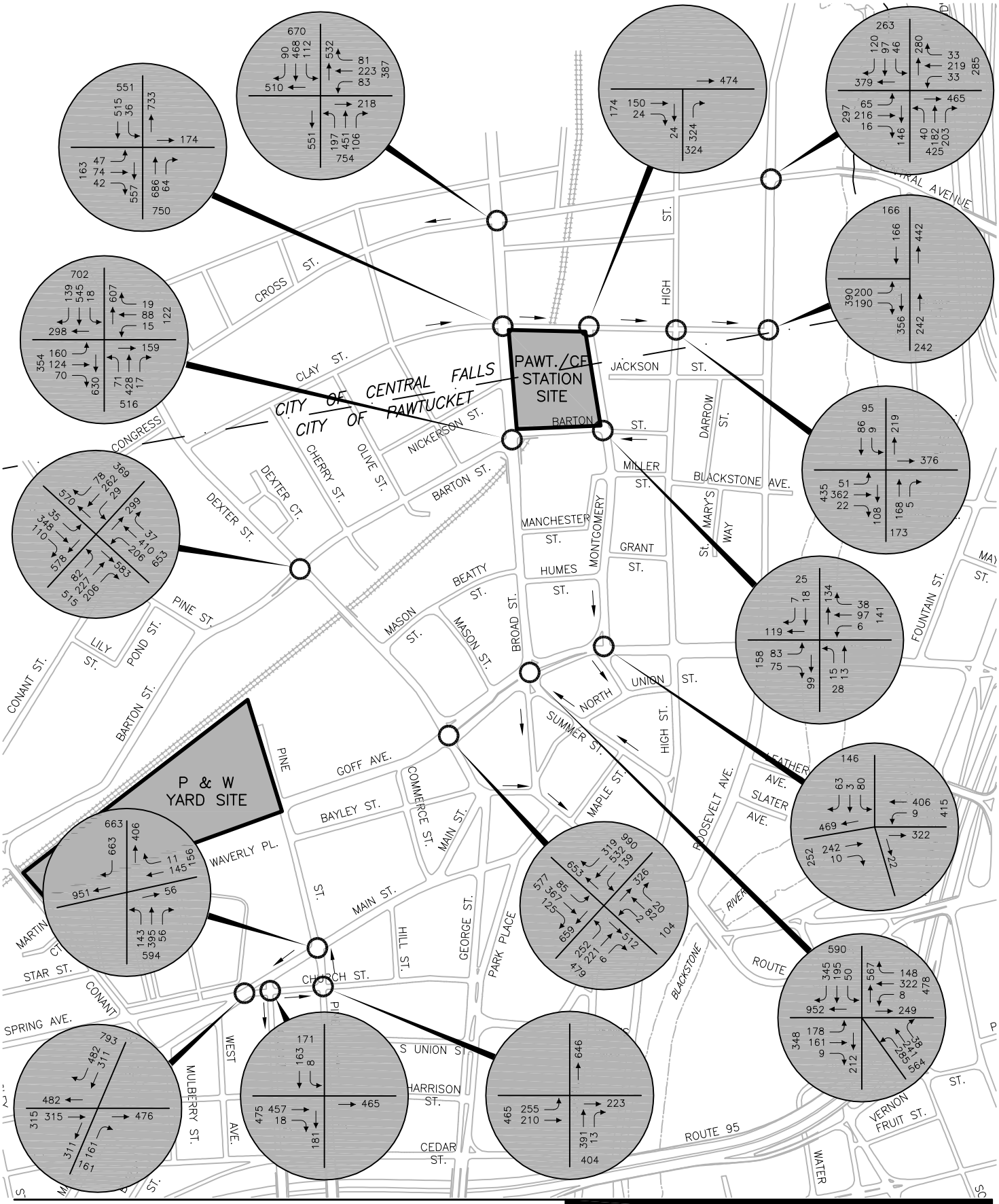
Trip Distribution for
P & W Yard Site



Pawtucket/Central Falls Commuter Rail Facility
Feasibility Study and Site Analysis

Figure 8

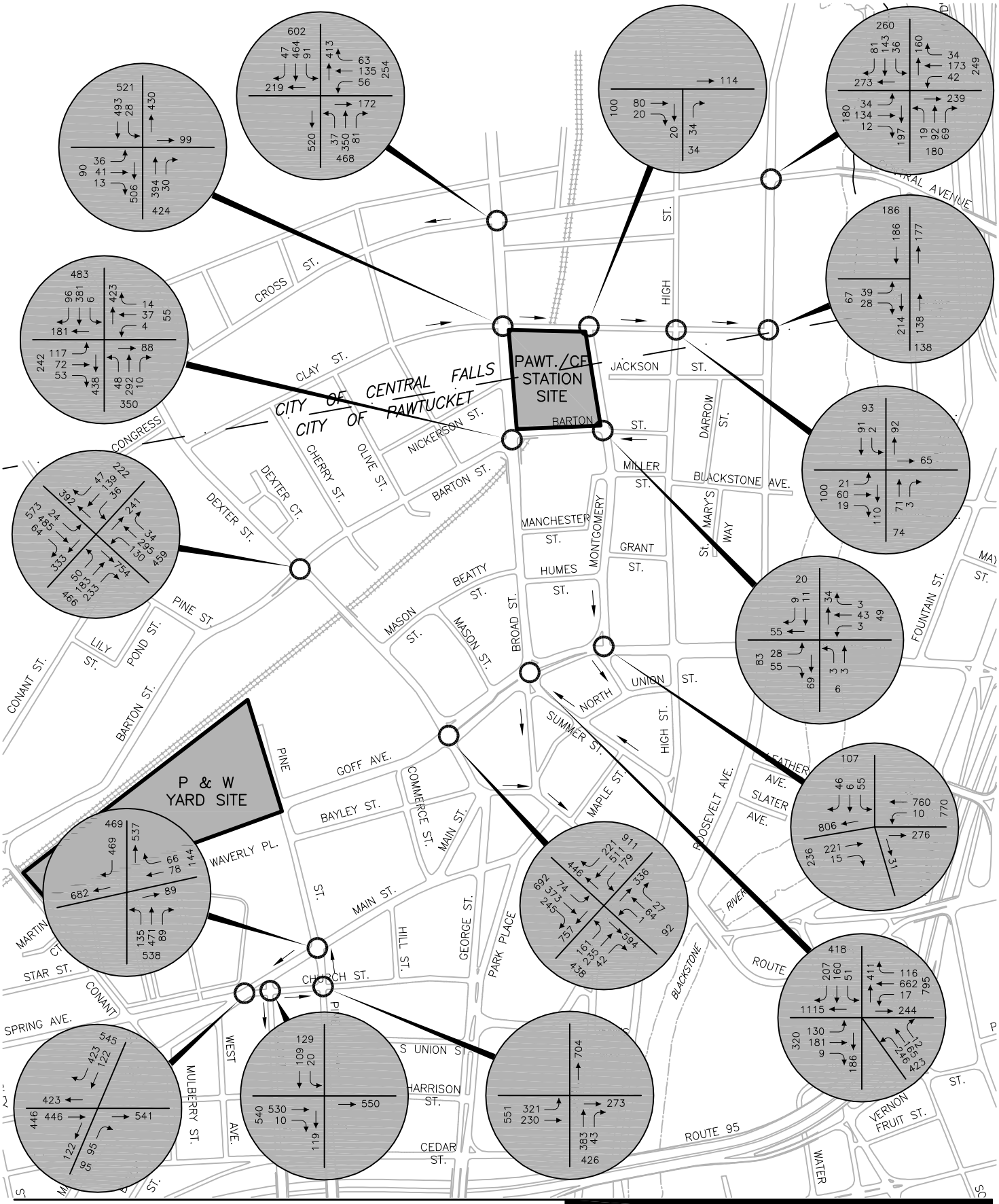
2010 AM Peak Hour Traffic
Pawtucket / Central Falls Station Site



Pawtucket/Central Falls Commuter Rail Facility
Feasibility Study and Site Analysis

Figure 9

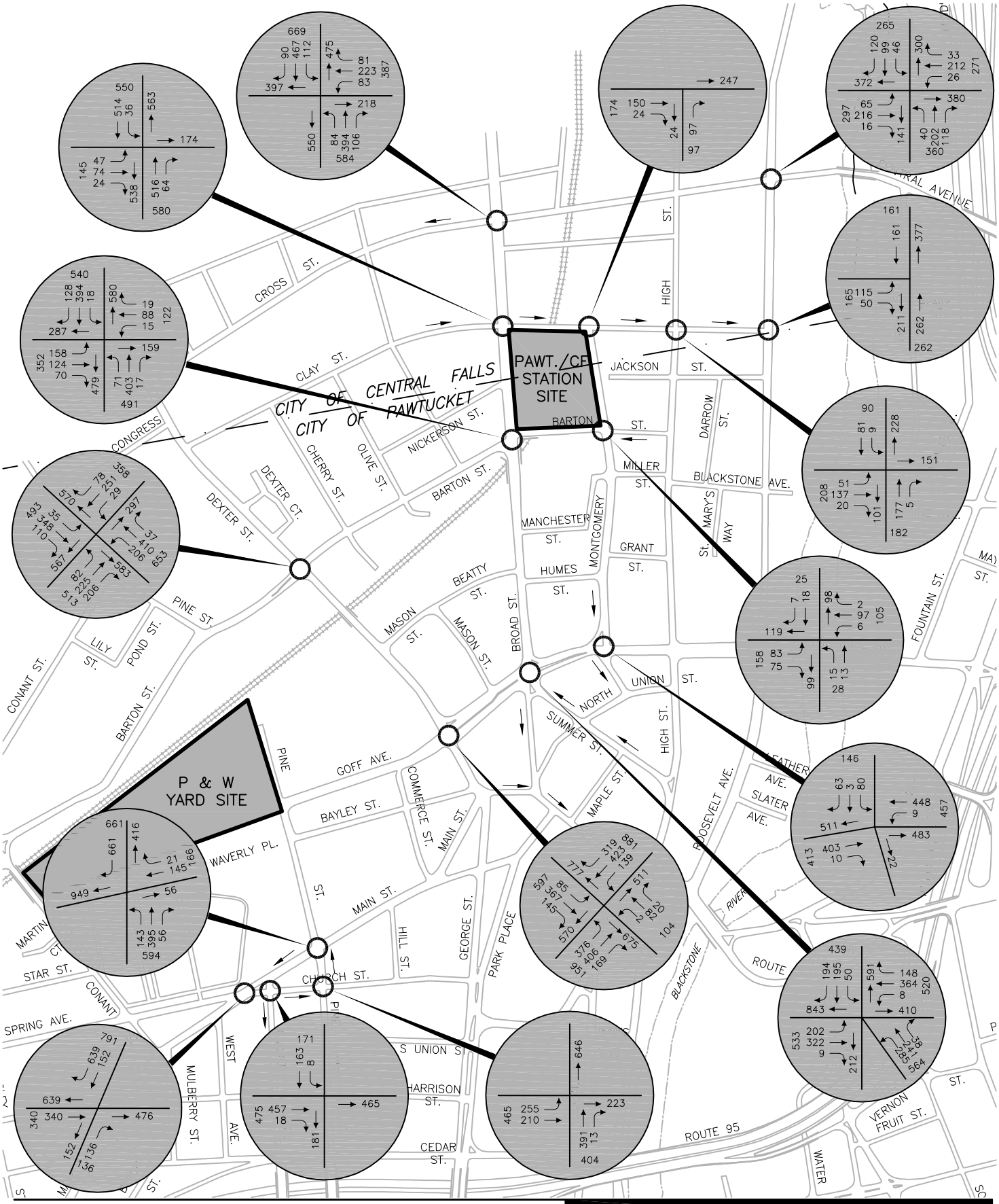
2010 PM Peak Hour Traffic
Pawtucket / Central Falls Station Site



Pawtucket/Central Falls Commuter Rail Facility
Feasibility Study and Site Analysis

Figure 10

2010 AM Peak Hour Traffic
P & W Yard Site



Pawtucket/Central Falls Commuter Rail Facility
Feasibility Study and Site Analysis

Figure 11

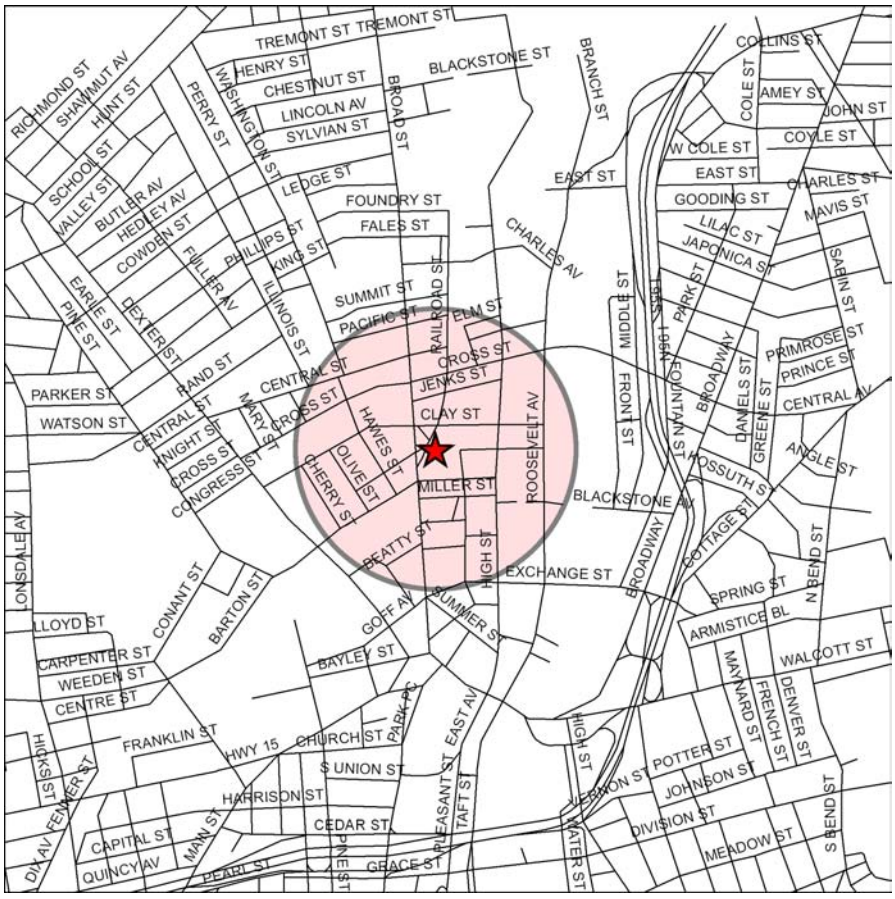
2010 PM Peak Hour Traffic
P & W Yard Site

Traffic and Parking Analysis

The information presented previously in the chapter on "Traffic Evaluation" has been used to identify parking and traffic impacts related to the rail station itself and the transit-oriented development. Available parking within a quarter-mile radius of the proposed rail site has been inventoried. Off-site traffic improvements have been developed.

Parking Survey

A parking survey was conducted for the proposed site of the Pawtucket/Central Falls Commuter Rail Facility. The parking survey was conducted on May 30, 2007 between 9 AM and 4 PM. The parking survey was conducted in a one-quarter mile radius of the train station. The survey area is shaded below.



The inventory did not reveal off-street public parking areas. The off-street parking in this area consisted of private property serving the adjacent residential and commercial sites. There were no off-street parking areas available for general public parking.

There are a total of 561 on-street parking spaces within one-quarter of a mile of the proposed rail station. The on-street parking serves both the residential and the commercial land uses. The on-street parking spaces were identified on a block-by-block basis. The inventory revealed several locations with "time restricted" on-street parking. A summary of the on-street parking is provided in Table 1 below.

Pawtucket/ Central Falls Commuter Rail
Summary of Parking Inventory

Street	Total Number of Spots	Number of Spots with Parking Restrictions	Posted Parking Restrictions
Pacific Street	28		
Central Street	33	2	Handicap Parking Only
Cross Street	18		
Jenks Street	12		
Clay Street	66	19	1 Hour Parking
		2	Nurses Parking Only
Nickerson Street	18		
Jackson Street	18		
Barton Street	27	6	3 Hour Parking
Miller Street	5		
Blackstone Avenue	0		
Manchester Street	0		
Grant Street	8		
Mason Beatty Street	0		
Humes Street	13	5	1 Hour Parking
Cherry Street	15		
Mason Street	0		
Olive Street	18		
Hawes Street	29		
Broad Street	67	13	1 Hour Parking
		23	2 Hour Parking
Railroad Street	22		
Montgomery Street	62	10	3 Hour Parking
		9	2 Hour Parking
		9	1 Hour Parking
		4	15 Minute Parking
Elms Street	5		
High Street	51	4 3	2 Hour Parking
		3	1 Hour Parking
		1	Handicap Only Parking
Darrow Street	11		
St. Mary's Way	0		
Roosevelt Avenue	35	7	15 Minute Parking
		3	90 Minute Parking
TOTAL:	561	116	

GRA notes that in the non-residential areas, there are signs posted which read "NO PARKING TOW ZONE, MONDAYS 8 AM TO 3 PM, APRIL-NOVEMBER, STREET SWEEPING." These signs are generally ignored by the public.

Traffic Analysis

The traffic analysis conducted for this project has included the inventory and evaluation of existing traffic conditions, the projection and evaluation of 2010 background traffic volumes, trip generation, distribution, and assignment for the proposed commuter rail sites, and an evaluation of the traffic operations associated with the two rail sites under consideration. These analyses are described in detail in the chapter on "Traffic Evaluation."

Since the initial traffic evaluation, the Pawtucket/Central Falls Station Site has been identified as the preferred alternative. The traffic analysis described herein involves conceptual improvements aimed at mitigating the traffic impacts of the preferred alternative rail site.

Potential Locations for Improvements

In selecting the locations for potential improvement, the results of the accident and capacity analyses were considered. Key intersections in the study area with accident rates greater than 1.5 accidents per million entering vehicles (MEV) were identified. Of these locations, the intersections that will be affected by the proposed rail station were identified as potential improvement locations. These include:

- Broad Street/Cross Street
- Broad Street/Clay Street
- Broad Street/Barton Street
- Barton Street/Dexter Street

Capacity analyses were conducted for key intersections in the study area for a number of scenarios including the projected 2010 traffic volumes with the proposed commuter rail station at the preferred site. Based upon the capacity analysis results for that scenario, key intersections with poor Levels of Service projected were identified as potential locations for improvements and included:

- Broad Street/Clay Street
- Broad Street/Goff Avenue/Exchange Street

Key intersections in the project area at which Level of Service declined by more than one level were also identified as potential locations for improvements. One intersection was identified and included:

- Broad Street/Cross Street

Proposed Conceptual Traffic Improvements

A wide range of traffic improvements were considered for the locations cited in the previous section. For example, traffic signal installations, conversion to one-way streets, signal coordination, the provision of additional capacity, and pedestrian improvements were considered. The overall benefit of each improvement was assessed and the various improvements were compared.

The improvements that achieved the greatest traffic benefit were recommended.

The proposed train station is expected to draw traffic from various directions. The trip distribution was discussed in detail in the Chapter on Traffic Evaluations. Within that chapter, a graphic entitled "Trip Distribution for Pawtucket/Central Falls Station Site" shows the dispersion of traffic as relates to the station site. The distribution occurs fairly evenly in a radial manner and as such, the impact of the additional traffic is also fairly evenly dispersed. There is not any one area of the City street system that bears the burden of impact. As a result, traffic operations in the project area are generally at adequate Levels of Service for an urbanized area even with the additional traffic expected to be generated by the rail station.

There are two intersections with poor levels of service and improvements are recommended at each of these intersections.

The intersection of **Broad Street/Goff Avenue/Exchange Street** is expected to operate at LOS "E" during the peak hours with the rail station traffic. This intersection carries large volumes of traffic. With the exception of the Broad Street southbound approach, each approach has at least two approach lanes. If the Broad Street southbound approach were to be widened to accommodate two approach lanes at this intersection, the overall intersection LOS would improve to LOS "C." This improvement is recommended. Note that right-of-way may be required to implement this traffic improvement.

The intersection of **Broad Street/Clay Street** is currently unsignalized and by 2010, the side street approach is expected to reach capacity. With the rail station traffic, the Clay Street approach will reduce to LOS "F." Signalization was considered at this intersection. The Federal highway Administration (FHWA) publishes warrants for the installation of traffic signals in the Manual on Uniform Traffic Control Devices (MUTCD). The warrants are based upon a variety of factors including traffic volumes, lane arrangements, speed, pedestrian activity, systems, and accident history. Due to the limited data available for this location, all of the warrants could not be evaluated. The intersection does meet the Peak Hour Warrant based upon the 2010 peak traffic volumes with the rail station. Based on this and the potential of this intersection to operate as part of a coordinated signal system, traffic signal installation is recommended for Broad Street/Clay Street.

Furthermore, Clay Street intersects Broad Street between two signalized intersections; Broad Street at Barton Street and Broad Street at Cross Street. The three intersections were evaluated for signal coordination. Coordinatability analysis reports were run for these intersections.

Coordinatability factors range from 0 to 100 and the higher the factor, the more beneficial the coordination. Coordination is generally recommended for locations with coordinatability factors greater than 50. The factors are based on a number of elements including travel time, storage space, main street volume, cycle length increases, and the proportion of traffic in the platoon. The coordinatability factors for these intersections were between 65 and 81 in the AM peak hour and between 70 and 100 in the PM peak hour. Based upon these results, **signal coordination on Broad Street at Barton Street, Clay Street and Cross Street** is recommended.

Pedestrian access is good throughout most of the study area. The major roadways have adequate sidewalks and most of the traffic signals have pedestrian signal heads and phasing. **At the intersection of Broad Street/Clay Street, crosswalks should be painted and the proposed traffic signal should include pedestrian signal heads and pedestrian phasing**.

The locations of the recommended conceptual traffic improvements are presented on Figure 1. The improvements were evaluated in terms of capacity analyses. The results were compared to the previously projected Levels of Service (LOS) and are shown in the following table.

TABLE 1
SUMMARY OF SIGNALIZED INTERSECTIONS CAPACITY ANALYSIS RESULTS

2010 with Pawtucket/Central Falls Station SIte LEVEL OF SERVICE/AVGERAGE CONTROL DELAY (Sec./Veh.)				
	AM PEAK		PM PEAK	
SIGNALIZED INTERSECTIONS	without improvements	with improvements	without improvements	with improvements
BROAD ST & CROSS ST				
CROSS ST WB	C/21.7	E/78.1	C/28.7	E/77.5
BROAD ST NB	D/45.3	D/47.1	E/64.9	D/36.2
BROAD ST SB	B/12.2	A/9.9	B/11.6	B/12.6
OVERALL INTERSECTION	C/26.4	D/37.9	D/37.0	D/36.2
BROAD ST & CLAY ST				
CLAY ST EB	unsignalized	C/25.6	unsignalized	C/31.2
BROAD ST SB	intersection	A/3.6	intersection	A/8.1
BROAD ST NB		A/5.8		A/5.5
OVERALL INTERSECTION		A/9.3		B/10.0
BROAD ST & BARTON ST				
BARTON ST EB	B/17.5	B/18.1	C/20.2	C/33.2
BARTON ST WB	B/13.1	B/13.7	B/13.4	B/18.0
BROAD ST NB	B/10.3	B/17.9	B/11.4	B/15.7
BROAD ST SB	B/13.3	B/11.9	C/24.8	B14.5
OVERALL INTERSECTION	B/12.9	B/15.7	B/18.6	B/19.0
BROAD ST & GOFF AVE/ EXCHANGE ST				
GOFF AVE EB	C/33.5	C/27.3	B/13.5	B/11.8
EXCHANGE ST WB	D/54.8	C/20.8	D/35.9	C/31.9
BROAD ST NB	E/71.6	C/33.8	F/102.7	D/39.9
BROAD ST SB	E/76.6	D/50.9	F/114.3	D/50.2
OVERALL INTERSECTION	E/58.0	C/32.5	E/76.7	D/36.3

As the results indicate, the recommended improvements result in adequate levels of service at these intersections based upon 2010 traffic volumes with the commuter rail traffic. Note that the signal coordination on Broad Street at Barton Street, Clay Street, and Cross Street results in a slight decrease in overall Level of Service at Cross Street. The timings of the coordinated signal system are set to optimize the main street traffic flow. Sometimes the traffic operations of the minor street are sacrificed for the good of the arterial flow when a system is coordinated. The LOS on Broad Street through the coordinated signal system is as follows:

Arterial Level of Service – Broad Street

	Northbound	Southbound
AM Peak Hour	LOS "D"	LOS "C"
PM Peak Hour	LOS "D"	LOS "C"

Additional improvement concepts were considered. For example, the conversion of two-way roadways to one-way traffic was considered to consolidate conflict points and to possibly allow more on-street parking. However, the benefits of such conversions were outweighed by the impacts to the surrounding community.

While most of the recommended improvements were identified based upon the results of capacity analyses, improvements were also considered for intersections with a high occurrence of accidents. As discussed previously, four intersections were identified as potential improvement locations based upon the accident rates. Recommendations have been proposed at three of these intersections including Broad Street/Barton Street, Broad Street/Clay Street, and Broad Street/Cross Street. These three intersections are in close proximity to the proposed rail station and will be affected by the traffic generated by the commuter rail station.

The fourth intersection with a high accident rate is Barton Street/Dexter Street. Although this intersection is not in the immediate proximity of the proposed commuter rail station, it will carry some additional traffic generated by the rail station. The additional traffic does not reduce the intersection Level of Service as shown previously in the "Traffic Evaluation" chapter. Based upon the existing conditions and accident history, **further study of Barton Street/Dexter Street is recommended.** Collision diagrams should be prepared to determine whether there are discernable patterns of

accidents at this location. The need for the additional studies at this intersection is not a result of the proposed commuter rail station.

In summary, the traffic recommendations are:

- Signalize Broad Street/Clay Street. Install crosswalks and provide pedestrian phasing.

- Coordinate the traffic signals on Broad Street at Barton Street, Clay Street, and Cross Street.

- Increase the capacity of the Broad Street southbound approach at Goff Avenue and Exchange Street.

- Conduct a safety analysis at the Barton Street/Dexter Street intersection.